COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Framingham, Mass., and additional mailing offices

© 1981 by CW Communications, Inc.

Vol. XV, No. 16 April 20, 1981 $1.25 a copy; $36/year

NEWSPAPER

Tandem Adds Nonstop II

By Jeffry Beeler
CW West Coast Bureau

CUPERTINO, Calif. — Tandem Computers, Inc. last week extended its hardware architecture with the introduction of its second major product — a transaction-processing system that reportedly improves the company's network expandability and is compatible with Tandem's existing software and peripherals.

Although not strictly a 32-bit system, the firm's latest offering — designated Nonstop II — incorporates a 32-bit data access architecture that provides users with a virtual addressing space of 1G byte per processor and 16G bytes per system, a company spokesman said.

This extended addressing capability gives the Nonstop II up to 16-fold greater I/O transfer and buffer space,

(Continued on Page 8)

Product Spotlight

Net Processors Filling Key Roles

By Brad Schultz
CW Staff

The communications processor arena is likely to be especially active this year. What IBM does with its communications processor offerings will suggest how far the largest DP supplier is willing to go in allowing its products to communicate cost-effectively with products from other vendors.

The plurality of installed communications processors are IBM 3704s and 3705s, but a number of vendors offer data network users plug-compatible equivalent models, some of which offer capabilities IBM does not.

Makers of 370X-compatible processors have not hesitated to meet growing user demand for the protocols of open systems interconnection, while IBM continues to demur on domestic support for X.25, the most famous of such protocols.

Users did not express much disappointment with 3704s and 3705s in a recently released Datapro Research Corp. survey [CW, April 6]. Both processor families had average scores of at least "good" in every category Datapro considered.

And in the category of overall satisfaction, both families garnered 3.5 averages (a 4.0 average would have indicated an "excellent" rating from all 26 3704 respondents or from all 92 3705 respondents). Still, several oth-

(Continued on Page 17)

Rivals 4341-2, VAX

Prime Supermini Most Powerful Yet

By Tim Scannell
CW Staff

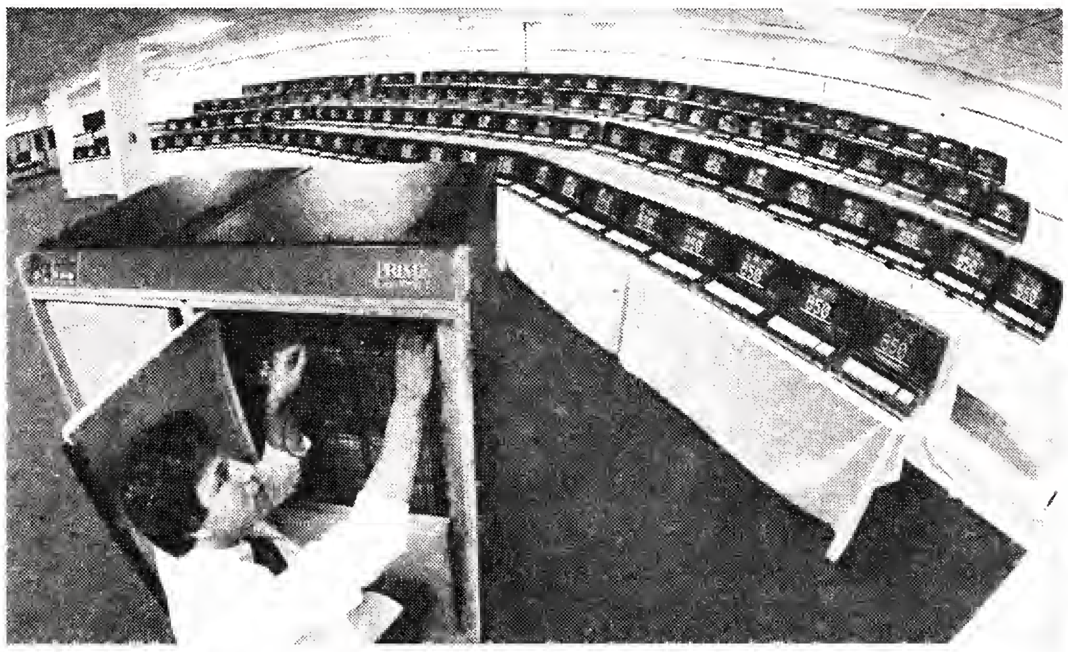
NATICK, Mass. — Prime Computer, Inc. last week furthered its supermini push onto mainframe turf by introducing a 32-bit computer system said to rival the performance of IBM's 4341-2 and to provide from 60% to 90% more processing power than Digital Equipment Corp.'s VAX-11/780.

At the same time, the company phased out two of its mid-range processors and beefed up the processing capabilities of its present systems by as much as 70%.

The Prime 850, the newest member of the 50 series family, is reportedly the first multifunctional virtual memory minicomputer to incorporate a multiple instruction stream processing architecture. It is also reportedly the first computer to use 1M-byte memory boards that are made up of 64K-byte random-access memory chips.

Although the system is competitively aimed at computers in the VAX-11/780 range, its performance is rated by the company to be in the 4341-2 and Decsystem-2060 mainframe class.

The 850 has from 2M- to 8M bytes of main memory and a 512M-byte virtual address space per user. The system also features a 32M-byte user program address space and can simultaneously support 128 terminals and active user processes, a spokesman said.



A technician fine tunes a Prime 850 supermini.

Basically, the machine's multistreaming structure allows it to process more user programs per unit of time without impacting machine cycle, increasing disk transfer speeds or adding to the system's instruction set, the spokesman stated. Architecturally similar to IBM's 3081, the 850 delivers at least 50% more throughput than competing 32-bit systems and replaces the 750 as the firm's top-of-the-line model.

The 750 and other systems in the 50 series incorporate a multiprogramming, rather than a multiprocessing, architecture, the spokesman added.

Prime's newest machine member began as an internal development project to investigate the multi-

(Continued on Page 8)

ACLU Slams Reagan's Data Bank Plan

By Bill Laberis
CW Staff

WASHINGTON, D.C. — The American Civil Liberties Union (ACLU) has assailed a Reagan administration plan to ferret out welfare fraud by creating a computerized national data bank that would list the identities of some 25 million Americans receiving public assistance.

Charging that the data bank would constitute a "gross violation of existing federal laws designed to protect the privacy rights of all individuals," ACLU Natonal Director John Shattuck said his group will lobby for the system's defeat and will probably initiate court action if the proposal passes an upcoming congressional test.

The proposed National Recipient Information System, unveiled in Congress recently by Health and Human Services Secretary Richard S. Schweiker, would be the first effort at drawing up a comprehensive list of all welfare recipients.

It is not the first attempt by an administration, however, to gain the necessary congressional approval for such a list. Similar measures had been proposed by the Johnson, Nix-

(Continued on Page 5)

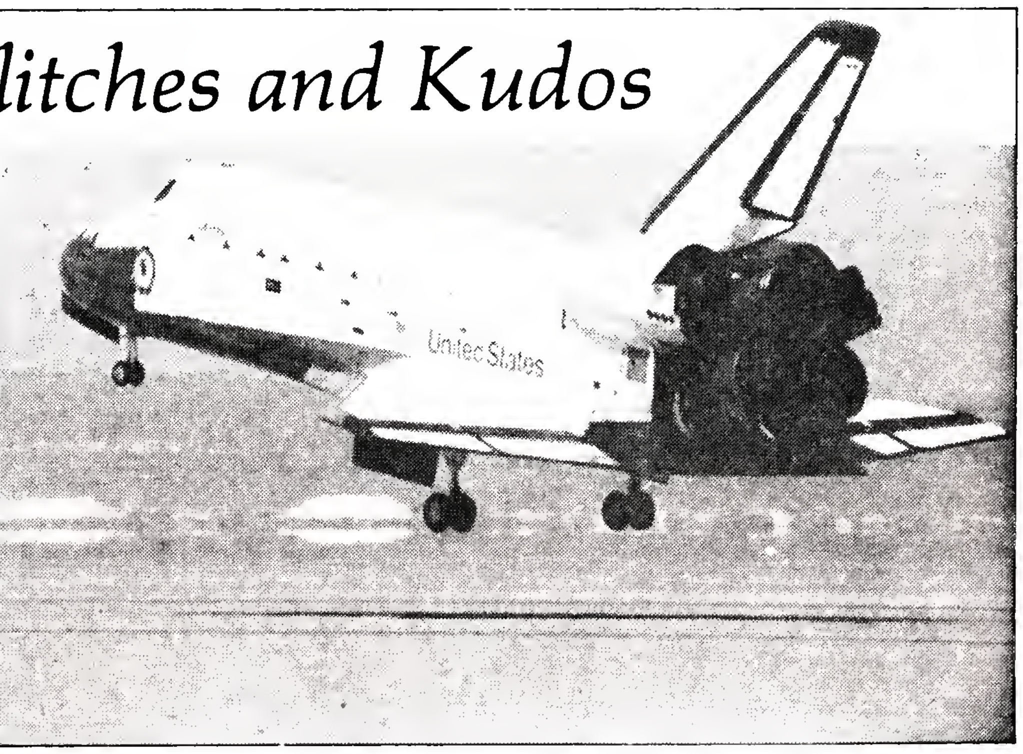
'Columbia': Glitches and Kudos

By Tim Scannell
CW Staff

KENNEDY SPACE CENTER, Fla. — Troubled by a balky on-board computer that scrubbed its initially planned launch, the space shuttle *Columbia* roared into an early morning sky last week and performed flawlessly during its nearly 55-hour mission in space.

Guided by a sophisticated microwave scanning beam landing system and steered by four of the five redundant on-board IBM System/4 Pi model AP-101 computers, *Columbia* glided in at more than 250 miles per hour

(Continued on Page 11)



COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM reg. U.S. Pat. Off.

Editor	E. Drake Lundell Jr.
Managing Editor	John C. Whitmarsh
News Editor	Cheryl M. Gelb
Senior Editors:	
Industry	Marcia Blumenthal
Features	Jack B. Rochester
Systems	Timothy J. Scannell
Communications	Brad Schultz
Software	Rita Shoor
Senior Writer:	
Communications	Phil Hirsch
Correspondents:	
West Coast	Jeffry Beeler
Washington, D.C.	Jake Kirchner
New York City	Bob Johnson
Writer/Analyst	Marguerite Zientara
Staff Writers	Tom Henkel Bruce Hoard Bill Laberis Lois Paul Deborah Wise
Writer/Photography Editor	Ann Dooley
Chief Copy Editor	Catherine Marenghi
Copy Editors	Nancy Fleming Steve Milmore Linda Rosenthal Barbara T. VanScoyoc Donovan White
Editorial Assistants	Susan M. Blakeney Cheryl Brady
Editorial Cartoonist	Jim Orton
Contributors:	
Education	J. Daniel Couger
Taylor Reports	Alan Taylor
Human Connection	Jack Stone

For Sales, Circulation and Production contacts, see inside back page.

Please address all correspondence to the appropriate department at Box 880, 375 Cochituate Road, Framingham, Mass. 01701. Phone: (617) 879-0700. Telex: 95-1153

OTHER EDITORIAL OFFICES:

New York City: Suite 7G, 401 East 80th St., New York, N.Y. 10021. Telephone: (212) 570-2135.

West Coast: 257 Lytton Avenue, Palo Alto, California 94301. Phone: (415) 328-8064.

Washington, D.C.: 821 National Press Building, 529 14th Street N.W., Washington, D.C. 20045. Phone: (202) 347-6718.

England: Steve Burton, IDG Publishing Ltd., 146 Clerkenwell Road, London EC1 Phone: 01-837-1222. Telex: UK-269477.

W. Germany: Eckhard Utpadel, CW Publikationens, Friedrichstrasse 31, 8000 Munich 40, Phone: (089) 34-90-61. Telex: 5215350.

Asia: Hidetsuna Sasaki, Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 455-6101. Telex: J2424461.

Australia: Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 4395133, Telex: SECCO AA25468.

Brazil: Eric Hippeau, Data News, Computerworld do Brazil, Servicos e Publicacoes Ltda., Rua Alcindo Guanabara, 25/10th floor 20031 Rio de Janeiro, RJ Brazil. Phone: (021) 240-8225. Telex: 2130838(WORD BR).

Mexico: Kevin Kelleghan, Computerworld de Mexico, Oaxaca 21-2, Colonia Roma, Mexico City 7 D.F., Phone: (905) 514-4218, (905) 514-6309.

Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. *Computerworld* (ISSN-0010-4841) is published weekly, except: semiweekly the third week in March and a single combined issue the last week in December and the first week in January by CW Communications Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Copyright 1981 by CW Communications/Inc. All rights reserved. Reproduction of material appearing in *Computerworld* and *Computerworld Extra!* is forbidden without written permission. Send all requests to Nancy M. Shannon.

$1.25 a copy: U.S.— $36 a year; Canada, Central & So. America — $65 a year; Europe and Near East — $125 a year; other foreign — $175 a year (airmail service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

ABC RED TAG ABP MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., Box 880, 375 Cochituate Road, Framingham, MA 01701.

Affects Wats Customers

Bell Plans 16% Interstate Rate Hike

By **Bruce Hoard**
CW Staff

WASHINGTON, D.C. — AT&T filed tariffs with the Federal Communications Commission (FCC) here recently to raise rates for interstate telephone calls by 16%. The increase would produce an additional $1.4 billion in yearly revenues for Bell.

The rate hike, which was approved by the FCC on April 6, will authorize the common carrier to gain a 12.75% profit margin on the long-distance calls, up from the current 10.5%. About $26.1 billion of the Bell System's $51.7 billion in annual revenues now comes from long-distance calls.

Bell filed the tariffs April 10, saying they are necessary "to assure the Bell System's ability to continue to provide good telephone service in the face of galloping inflation and record-high interest rates," according to James R. Billingsley, AT&T vice-president for regulatory matters.

The proposed 16% increase will also apply to Wide Area Telecommunications Service (Wats) users.

Although the FCC allowed Bell an interim 5%, $500 million annual hike last June, this latest action paves the way for the first formal interstate toll call increase in five years.

The commission's April 6 announcement approving the increase was the culmination of two years of proceedings that were instigated in March 1979, when Bell asked for a 13% rate of return on both interstate and overseas calls.

If approved, the new rates would not apply to overseas calls, but would be applicable to such "offshore" points as Bermuda, Puerto Rico and the Bahama Islands.

Exact charges for customers who make interstate calls would depend on the number and types of calls made, their distance and when they are placed, a spokesman said.

For instance, a customer who makes a three-minute direct-dial call on a weekday between Washington, D.C., and Los Angeles, which now costs $1.37, would pay $1.58 under the new tariffs.

Exactly when the new tariffs will go into effect is not yet known. However, in its April 6 press release approving the hike, the FCC said it had instructed its staff to prepare a final decision, which would be available "within a few weeks."

After that decision has been published, the tariffs will become effective in five days.

Had AT&T been denied the increase or allowed an increase it considered to be inadequate, the company would have filed for the allowable hike and then petitioned the FCC for a rehearing, the spokesman claimed.

Judge Calls for Briefs From Groups Opposing Consent Decree Ruling

By **Bruce Hoard**
CW Staff

NEWARK, N.J. — A federal district court judge here has called for "friend of the court" amicus briefs from industry groups opposing the Federal Communications Commission's (FCC) interpretation of the 1956 Consent Decree regulating AT&T. The briefs are to be submitted by April 27.

The decision by Judge Vincent P. Biuno was rendered in an effort to decide whether AT&T foes will become parties to proceedings here to determine if Bell should be allowed to offer enhanced services and terminal equipment on a deregulated basis through separate subsidiaries.

In its Second Computer Inquiry Decision last December, the FCC interpreted the Consent Decree in a decidedly favorable manner for Bell.

The phone company, it said, could market computer-based on-line information services, smart terminals and other "enhanced" offerings through separate subsidiaries on a deregulated basis without violating the 25-year-old Consent Decree.

Under the decree's original strictures, Bell was generally limited to providing regulated communication services and facilities.

AT&T opponents would gain considerable strength from the "party" status they seek. It would allow them to introduce evidence, question AT&T witnesses, demand relevant Bell documents and appeal the court's ultimate decision.

On the other hand, the phone company's opposition would have to settle for a much diminished role in the proceedings if not granted party status.

This Week

IN DEPTH

Negotiating Documentation Peace . . Follows Page 60
Designing Computer Models That Work . . . . . . ID / 10

NEWS

Cause for Concern Seen in Privacy Laws 4
IBM Unexpectedly Asks Dismissal of Suit 5
Federal DP Faces Conflicting Rules, Expo Told 6
Insurance Firm Breaks Into Series / 1 Sales 9
'Columbia' Launch: Pomp and Thorns 10
GE Moves Full-Force Into Factory Automation 12
Professor Bemoans Indifference to DP Education . . 13
Pregnant CRT Operators Win Work Boycott 14
Local Policymakers Seen Using Data as Weapon . 15
Sampling of IBM 370X-Type Net Processors 18
ACS Trains Retirees to Fill Programming Slots 20
Demand for Technical Managers Found Rising 21
FAA Radar Backup No Improvement: Patco 22
Grim Future Seen for Firms Shunning CAD 24
CAD / CAM Seen Reshaping U.S. Work Habits 25
Software Security Begins at Home, Users Told . . . 26
Foreign Corrupt Practices Act Called 'Blessing' . . . 27
Operations Staffers Decry Management Slights . . . 28
Bell, Carriers Debate Protocol / Code Conversion . . 29
Report Blasts State for Tax Program Failure 30
Alpha Micro, North Star Lead Series 2 Ratings . . . 31
GAO Slams Judicial Center for Poor Homework . . . 32
Relational Data Base Topic of ACM Seminar 33
Industry Asks Information Adviser to President 34
CPUs Helping Track Student Loan Defaulters 35
Keypunch Simulator Redefines 'User-Friendly' 36
Conference to Feature Teletel Demonstration 38
University's Users Offered Minicourse on DBMS . . 39
Chicken-Seller Puts Eggs in Forecasting Basket . . 40
IEEE Honors Inventor of Darlington Transistor 41

EDITORIAL

Editorial: Why IRM? 46
Can U.S. Hold Technological Lead? 47
Taylor Report: Forth May Help Cobol Users 47
Human Connection: Appraisal Format 47

SOFTWARE & SERVICES

Test Plan Essential for Software Reliability 53
NIH's 'Wylbur' Upgrade Free 54
Accounts Package Targets Clubs 55
'Docu-Master' Upgrade Expands Sort 56
System Targets CICS Under DOS 57
'CDIS' Features Data Base Orientation 58

COMMUNICATIONS

Distributed DP Seen Still on Horizon 61
Raytheon Controller Rivals 3274 62
Graphics Added to Tektronix 4010 Series 63
Data Capture Terminal Boasts LED Display 64

SYSTEMS & PERIPHERALS

NCR Unveils I-9000 Small Business Line 65
Burroughs Brings Out Document Encoder 67

MINIWORLD

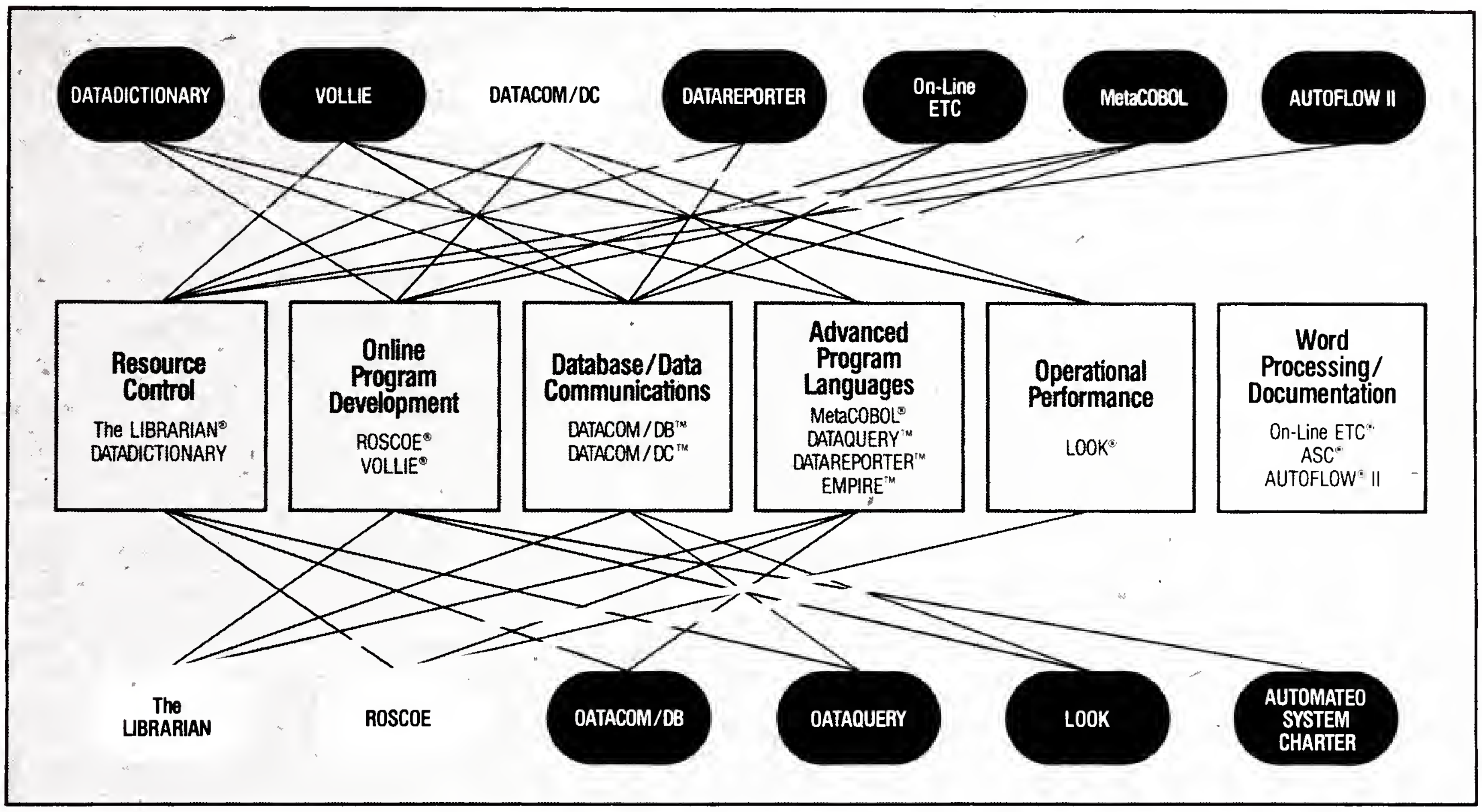
Course Boasts 100% Employment for Blind 69

COMPUTER INDUSTRY

'Japan, Inc.': Reality or Myth? 71
CDC Head Urges Semi Research Venture 71
'Fight Fire With Fire' Urged to Counter Japan 75
Japanese 'Invasion' Seen in Need of Perspective . . 76
Congressional Assists Predicted for Trade, Tax . . . 77
MAI to Acquire Braegen Assets 78
ADVERTISING INDEX 120

EASE OF USE

On-Line ETC®, ASC® and AUTOFLOW® II can meet all your word processing and system documentation needs.



Word processing with On-line ETC means the most up-to-date facilities for producing written material by computer. Indeed, it is a mainframe-based system to take advantage of the computer communications facilities that already exist at an installation. ASC and AUTOFLOW II complete a network of automated aids for system and program documentation.

With On-line ETC, preparing and maintaining written material is done at on-line CRTs or hard-copy terminals, where users input, update, examine and print documents that may range from short letters and memos to long technical manuals and price catalogs. A remarkable design simplicity makes On-line ETC so easy to use that anyone can be immediately productive. Yet ETC still offers its users sophisticated facilities to accomplish even those difficult tasks of document creation that are the hallmarks of a professional publication.

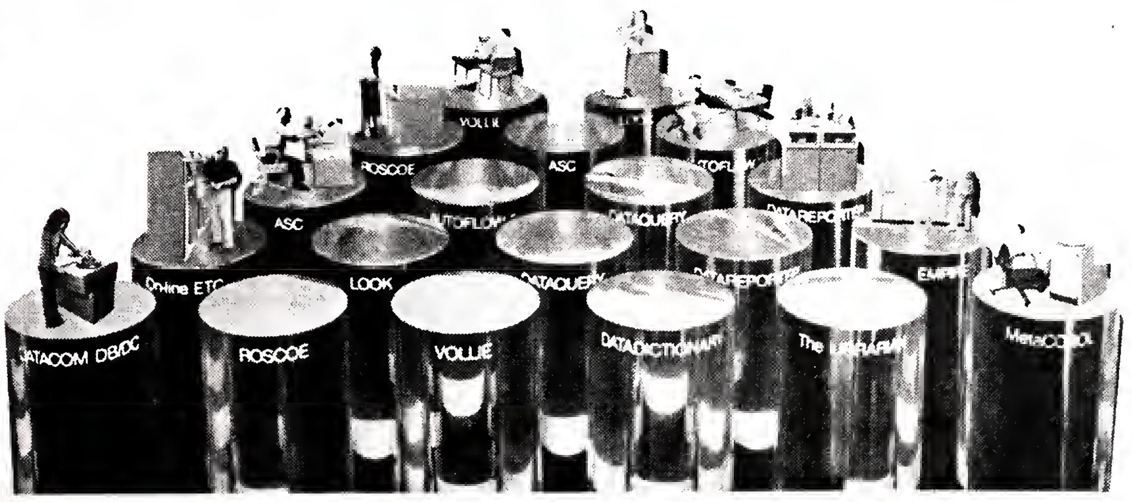
On-line ETC is just one of a complete network of documentation aids. The Automated System Charter (ASC) simplifies the creation and maintenance of system-level documentation. ASC produces system charts, tabular reports and cross-references from production JCL. In addition, a built-in report writer allows for complete user control in creating individualized reports. For program-level documentation, AUTOFLOW II produces flowcharts, cross-references and summary reports from source module input.

As part of its commitment to an integrated network, On-line ETC operates under ROSCOE and DATACOM/DC; ASC uses ROSCOE prompters for control statement creation and job submission; AUTOFLOW II accepts input from LIBRARIAN.

Look into On-line ETC, ASC and AUTOFLOW II, components of ADR's integrated network of systems software products — not only to solve today's problems but also to build a solid foundation for addressing the problems of tomorrow. For more information, contact your local ADR office or: Applied Data Research, Route 206 and Orchard Road, CN-8, Princeton, NJ 08540. Telephone: (201) 874-9100.

APPLIED DATA RESEARCH

The Big Difference is our integrated network.



Applied Data Research
Route 206 & Orchard Rd., CN-8
Princeton, NJ 08540

I am interested in:
- ☐ Management presentation
- ☐ Call from salesperson
- ☐ On-line ETC, ASC and AUTOFLOW II product descriptions

Name ____________
Title ____________
Company ____________
Address ____________
City ____________
State ____________ Zip ____________
Telephone ____________
Computer ____________

Cause for Concern Seen in Privacy Laws

By Brad Schultz
CW Staff

WALTHAM, Mass. — American law has moved unusually fast to deal with computer privacy problems, Harvard Law School professor Arthur R. Miller told a recent business ethics conference here, but the public has four main grounds for anxiety about whether the law adequately covers these problems.

At Bentley College's recent Fourth National Business Ethics Conference, the star of "Miller's Court," a popular series on Boston TV, listed these four main grounds as:

- "Too much data collection going on."
- An increasing number of decisions about how to control people are made on the basis of computer-stored files.
- The risks of data interpreted "out of context."
- Prospects for government surveillance.

Normally, jurisprudence adjusts slowly to the social impacts of new, widely applied technologies, Miller told the conference, so the number and scope of computing-related laws enacted in the past dozen years may be termed a legal "revolution."

Among these laws are the Fair Credit Reporting Act, the Education Privacy Act and the Fair Information Practices Act, Miller said.

The Fair Credit Reporting Act is intended to deter privacy violations by lending institutions, which employ computers to store and manipulate data on peoples' finances, Miller noted. The Education Privacy Act as amended in recent years mandates "a federal presence" in every one of the nation's schools, he added.

The latter federal law was written to protect an individual's privacy as private and public schools at every level stockpile computer-stored records of grades and evaluations of behavior, Miller continued, calling it "one of the most amazing pieces of legislation every enacted in a federalist country."

In the mid-1960s, privacy was usually considered a white, upper-middle class value, he said. Today, however, fears about losing privacy are expressed by many segments of society. The public widely regards computer technology as a persistent threat to privacy, he indicated, and as dehumanizing because computer storage of data prompts government and large companies to refer to people by code number instead of name.

As to the four main grounds for anxiety about privacy of computer-stored information, Miller said of the first point ("too much data collection") that government data collectors believe they must justify their jobs by filling memory capacities and then requesting larger systems for still more data collection.

"The plaintive wail of the longitudinal [government] researcher," Miller remarked, "is 'I might as well ask it, I might as well ask it. . .' "

On the second point (more decisions based on computer data), the Harvard University professor referred to common procedures for admitting people to academic programs. An individual can be automatically admitted or automatically rejected by a top U.S. law school on the basis of a single number, he told the business ethics conference.

The privacy rights of John W. Hinckley Jr., the man accused of attempting to assassinate President Ronald Reagan, may have been violated by the press, Miller suggested, as data extracted from Hinckley's computer-stored criminal records was extensively publicized in the days following the recent shooting.

Miller cited this case as exemplifying the third point from which people fear privacy abuse through computers (data taken out of context). Criminal records, such as those computer-stored at the Federal Bureau of Investigation's National Crime Information Center, sometimes turn out to be incorrect, he said.

On the fourth point (government surveillance), Miller mentioned several episodes in American history when the government violated civil liberties at a time of crisis. The massive and detailed records that agencies like the Internal Revenue Service store on computers could be used to monitor or constrain the movements of policy dissenters, the law professor warned.

Five Themes in Privacy

By Brad Schultz
CW Staff

WALTHAM — Five themes in the direction of law on computer privacy were cited by Harvard Law School professor Arthur R. Miller in his talk at Bentley College's recent conference on business ethics.

The themes were:

- Increasing acceptance of the notion that data collectors owe a "fiduciary obligation" to the data subject. This means that people or organizations that collect data are legally obliged to pursue such activities in "good faith," Miller explained. The person who is the subject of the data could thus claim damages from a collector that obtained the data through deception or that applied the data maliciously.
- Increasing recognition that some kinds of data should never be collected.
- Recognition that information systems warrant effective safeguards against abuse or breakdowns.
- Recognition that the subject of a data file has a right to access that file on demand.
- As Miller put it, "Information gets born, married, divorced, but — unlike people — never dies." Because computers allow data on a person to be stockpiled indefinitely, care should be taken that this data remains up to date and accurate.

Computerworld asked Miller whether the complexity of computing issues has become too much for the nation's judicial process to handle those issues adequately. Miller has written or co-authored more than 20 books on court procedure, the subject on which he is best known to his professional colleagues, and served on the federal Commission on New Technological Uses of Copyrighted Works, which advised Congress on whether software should be copyrighted.

Several times in history, American judges and juries have wrestled with the social impacts of a spreading new technology, the Harvard professor pointed out. While details of how complicated machinery operate may elude those who decide court cases, the fundamental rights laws are written to uphold are not so complicated; and those rights are what are at stake as the technology of computing proliferates, he said.

TP-270 NETWORK ANALYZER

The TP-270 provides a simple, easy-to-use method of determining network response time and the individual delays that contribute to response time. The device also provides a means of directly measuring the effects of software or hardware changes on the network performance.

FEATURES
- *Saves money by preventing network overkill while ensuring performance standards are met.*
- *Allows central site personnel to determine remote terminal performance.*
- *Available in 3270 Bisynch or SDLC/SNA versions.*
- *Optional printer interface provides for hard-copy reports.*
- *Remote control option allows "hands off" operation.*
- *Powerful diagnostics assist in network trouble shooting.*

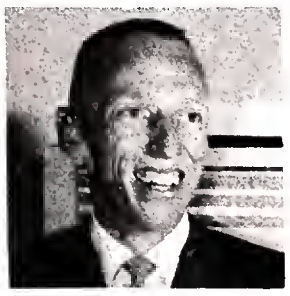
tp TeleProcessing Products, Inc.
Local Data Distribution
4565 E. Industrial St., Bldg. 7K, Simi Valley, CA 93063 • (805) 522-8149

For Managers Only

With application programs to be maintained and such problems as:

Bad Code **High Cost** **Low Morale**
High Turnover **Slippery Bugs** **No Documentation**
Big Backlog **Angry Users** **No Control**

There is an answer on July 6 - 8 in the Rocky Mountains at Boulder, Colorado.



Dr. Ned Chapin
Data Processing Consultant

On July 9-10, attend also Reducing Software Complexity Workshop to learn the new techniques.

For information on this 3-day workshop on the state-of-the-art, call or write K. Boyd at

INFOSCI INC.
(415) 854-1567
Box 7117, Menlo Park, California 94025

Practical training since 1965

Calls Trial 'Incurably Tainted'

IBM Unexpectedly Asks Dismissal of Suit

By Bob Johnson
CW New York Bureau

NEW YORK — In an unexpected move here last week, IBM formally motioned the court to dismiss the case or else declare a mistrial in the 12-year-old antitrust suit brought by the Department of Justice.

The motion, dated April 9, cited the Supreme Court ruling last January in the case of Upjohn Co. vs. the U.S., which expanded the privilege of confidentiality between lawyers and their clients.

The motion further claimed that a mistrial should be declared on the grounds that "the proceedings have been incurably tainted and IBM thereby prejudiced by the wrongful and plainly erroneous access plaintiff sought and was granted to documents subject to attorney-client privilege and work production protection."

In a memorandum supporting its motion, IBM cited the U.S. Supreme Court's decision in the Upjohn case, which demonstrated that rulings made by U.S. vs. IBM presiding Judge David N. Edelstein's court against IBM covering some 20,000 documents were "erroneous."

IBM claimed that it repeatedly argued against producing the documents the Justice Department insisted on seeing and that the court ignored IBM's opposition. IBM said that the Upjohn case clearly states that the government exhibited unique, unprecedented and unjustified invasion of the company's privileged communications.

"Never has a litigant had such unrestrained access to the advice, thinking and theories of its adversary's lawyers," IBM's memorandum stated.

Supporting its contention that the court had made errors on privilege rulings, IBM said the court has declared that lawyer-client communications are only privileged to the extent that they reveal information between the client and lawyer and that communication of legal advice is not privileged.

However, in the Upjohn case, IBM pointed out, the Supreme Court emphasized that the privilege protects confidential "communications," not "confidential information" such as trade secrets and specifically that "privilege exists to protect . . . the giving of professional advice."

Although IBM has repeatedly made an issue of privilege rulings, it has not used the issue as grounds for a mistrial until now.

At press time, the Justice Department was unavailable for comment.

ACLU Slams Data Bank Plan

(Continued from Page 1)

on and Carter administrations, but they were defeated by various congressional committees and administration task forces when opponents raised privacy issues, an ACLU spokesman said.

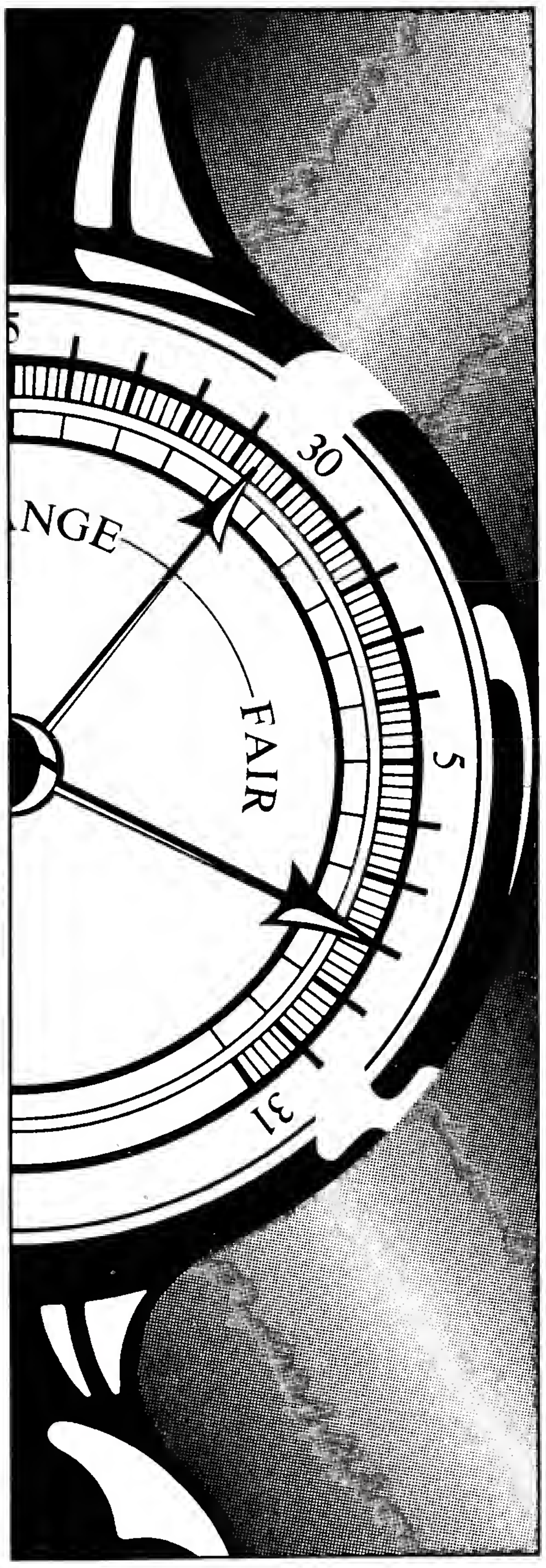
The proposed system would list public aid recipients by name, age, address, Social Security number, occupation, wages and aid benefits received from any governmental agency — municipal, state or federal. This information would be maintained and updated by computers at the Social Security Administration. It is unclear, however, just who will have access to this information.

According to published reports, the system would mandate that "the head of any federal agency, including the Internal Revenue Service, Veterans Administration and the Railroad Retirement Board shall, upon the request of the secretary [of Health and Human Services] provide any records within the control of the agency."

Once completed, the data bank could ostensibly be accessed to determine if an aid recipient's financial disclosure statements jibe with the records maintained by other governmental agencies. That is, consulting the data bank would help to identify those engaging in "double dipping," or getting more than their fair share from the various government aid programs. In the words of the administration, the system is designed to "assist in detecting fraud, abuse and waste and in maintaining the integrity of public assistance programs."

Critics of the system see it differently. ACLU's Shattuck said the system as proposed violates both the federal Privacy Act of 1974, which limits the purposes for which data can be centralized and disseminated to agencies other than those which originally collected it, and the Tax Reform Act of 1976, designed to protect the confidentiality of federal tax information.

"Granted, it is unclear just how broad-based this system will be," Shattuck said. "But they could end up with stores of data on things like SBA (Small Business Administration) loans, Medicaid payments and things that could cover virtually the entire population. It's going to be opposed by both liberals and conservatives."



Pressure

When the pressure is on to produce fast accurate reports, CA-EARL is more than a fair-weather friend.

The CA-EARL software system is an invaluable tool in the day-to-day operation of any EDP programming department. With a few simple commands, data is easily selected and automatically formatted. This frees-up your programming staff in record time.

However, it's during the "peak-load" periods that CA-EARL really shines. You'll be delivering timely reports to your whole company... *provided* you take the first step ***now.***

Send for more information on CA-EARL 3.1 the 'STORM TAMING" software package with Easy Access Report Language for IBM OS and DOS systems (VS and VSE included).

CA-EARL®

HEADQUARTERS
Computer Associates Building
125 Jericho Turnpike Jericho, NY 11753

Offices in the United States,
Europe, Australia, Canada and Japan.
Distributed in 32 countries world-wide.

MAIL THE COUPON
OR CALL TOLL-FREE
800-645-3003
[NY State Call: (516) 333-6700]
CANADA Call: (416) 842-2110

Member Software
Industry Association
ADAPSO

CW 4/20/81
COMPUTER ASSOCIATES
125 Jericho Turnpike, Jericho, NY 11753
YES! Send FREE information on CA·EARL
Name ____________________
Title____________________
Company ____________________
Address ____________________
City __________ State____Zip______
Phone__________CPU______OP/SYS______

Also send info. on:
☐ CA·SORT
High Performance Sorting
☐ CA·DYNAM/D
Disk Space Management
☐ CA·DYNAM/T
Tape Management System
☐ CA·DYNAM/FI
File Independence Facility
☐ CA·SOLVE
Symbolic COBOL Debugger
☐ CA·JASPER+
Job Accounting/Reporting
☐ CA·DRIVER
Job Management System

Federal DP Faces Conflicting Rules, Expo Told

By **Jake Kirchner**
CW Washington Bureau

WASHINGTON, D.C. — Federal data processing has been hit with a barrage of diverse and sometimes conflicting regulatory initiatives and budget directives in the first three months of the Reagan Presidency.

Some of the developments are holdovers from the Carter Presidency and some are the result of Reagan's ambitious budget-cutting actions. But all of them, as ticked off by former GSA official White Dodson at the Federal DP Expo here last week, promise profound impact on government information resources management. For example:

- The General Accounting Office (GAO) recently released a report on federal DP systems obsolescence, which "focuses on what everybody knew" — the federal DP inventory is so obsolete it would be cheaper, in many cases, to acquire new equipment, Dodson told a session of the Federal DP Expo here.
- The administration has instituted a freeze on new DP procurements pending approval of individual agency budget plans.
- The General Services Administration (GSA) has moved to reform DP acquisition regulations, to place more procurement authority on the agencies and is becoming more of a technical resource for agency contracting officers than a regulator of agency procurement activities.
- The Service Contract Act regulations that threatened to deprive at least some federal installations of DP services and maintenances have been put on hold — perhaps permanently — by the Reagan White House.

Added to Dodson's list is the Paperwork Reduction Act, signed by President Carter late last year, which is just now going into effect. The Office of Management and Budget (OMB) is beginning to issue directives for the farreaching reforms to DP management called for in the law.

Also, the Reagan federal hiring freeze is reportedly having adverse effects on a number of government DP programs and installations.

Most agency officials are taking these developments with the aplomb that comes from long years working in a largely intractable bureaucracy. But the questions being raised at the federal DP show here indicate a certain level of uneasiness on the part of federal DPers, a degree of uncertainty over future direction of government information management.

Dodson acknowledged the wide-ranging impact of some of these developments, but approached the issue from the fairly detached standpoint of one who has completed his hitch in the federal trenches.

Formerly assistant commissioner of GSA Automated Data and Telecommunications Service, Dodson is now president of Domay Corp. and director of research, Federal Division of International Data Corp.

Taking the recent developments in federal DP in turn, Dodson told his audience the GAO report on obsolescence is "probably the most significant thing that has happened in federal ADP in 10 years."

He noted the report, which came from the legislative side of government, urged agencies to immediately begin replacing equipment if they can show the new procurements would save more in operating costs than the costs of the new systems.

OMB Accepts Report

OMB, which has increased its role as lead agency in federal DP management under the paperwork reduction law, at first was negative about the report's recommendations, Dodson said. "Their concept of the bureaucracy was one completely beyond or out of control," he said. OMB did not think agencies would be willing or able to do anything about the obsolescence problem on their own, according to Dodson.

However, OMB has since come to accept the report and has indicated replacement of old equipment would be included in the long-range DP planning process called for in the new act and would consider equipment replacement in the regular budget cycle, Dodson said.

The procurement freeze, however, "is backing up into the obsolescence problem," according to Dodson, who said if agencies managed to get replacement funds approved as part of the budget reviews performed during the equipment freeze, then the old systems can soon be replaced.

GSA, the government's procurement agency, backed the report and claimed its regulations do not preclude replacing obsolete equipment if it can be justified as necessary to meet agency missions.

This meets the spirit of the GAO recommendations, Dodson noted, but the GAO report called for economical justifications for replacement, unlike the GSA with its emphasis on agency missions and procurement competition, which only adds to the confusion.

While agencies search for guidance on this problem, GSA insists its regulations do not stand in the way of justifiable equipment replacements. And the hiring freeze, which is not helping anyone at this point, has had added impact on GSA, Dodson noted.

"GSA has never had enough people. Now they've gone into a straight-jacket," he said. To help themselves maneuver. GSA officials have moved to simplify agency procurement responsibilities and liberalize agency authority.

GSA now "sees [itself] as a technological source for interagency use rather than a regulation source," Boston said.

For Software Package Sales in 1980

Million-Dollar Awards Go to 224 Firms

By **Marcia Blumenthal**
CW Staff

SAN ANTONIO, Texas — The Academy Awards of the independent software industry were given out here last week when International Computer Programs, Inc. (ICP) presented 224 awards to companies whose software products achieved cumulative sales between $1 million and $50 million during 1980.

Standing in for Johnny Carson at the 10th Annual Million Dollar Awards Ceremony was Larry Welke, ICP's president and resident humorist, who hosted the not-quite-black-tie ceremony and bestowed four rare awards on those achieving $50 million in sales.

Those awards went to the Continuum Co. for its Continuum systems package; to Management Science America, Inc. (MSA) for the MSA General Ledger System/FICS and the MSA Payroll Accounting System; and to Software AG of North America, Inc. for Adabase.

Until this year, only three other packages had achieved total sales of $50 million.

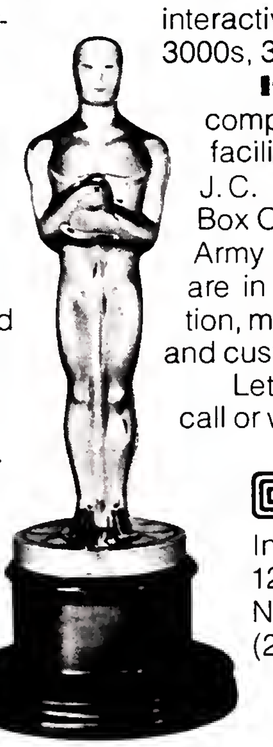
Although ICP has a $100 million sales award category, no company claimed that coveted prize this year. Last year, Cincom Systems, Inc. captured the first award ever given in that category for its Total data base management system.

Besides the four awards in the $50 million category, ICP gave out six awards for sales of $30 million, eight for sales of $20 million, 29 for sales of $10 million, 51 for sales of $5 million and 126 for sales of $1 million.

To date, 570 products have been honored, with this year's winners making up about 40% of the total number for the last 10 years. When the ceremonies were first established, only 29 products had reached the $1 million sales status. By comparison, this year alone 29 products received special awards for reaching $1 million in sales in just one year.

Garnering the six prized $30 million category awards were Applied Data Research, Inc. for Roscoe; Mathematica Products Group, Inc. for Ramis II; Pansophic Systems, Inc. for Easytrieve; Rand Information Systems, Inc. for Cids; Software International Corp. for the General Ledger and Financial System; and Whitlow Computer Systems, Inc. for Syncsort/OS. These six prizes bring to 13 the total number of $30 million citations awarded.

In addition to product awards, ICP also gave out 25 advertising achievement awards and 99 Super Software Seller awards. More than 250 executives attended the two-day ceremony and executive conference.



If FOCUS was a movie star, it would win an Oscar.

FOCUS, the total English-language software system, gets rave reviews because of its unsurpassed ease of use. Its high-level English-language commands can develop complete applications in as little as 1/10th the time of procedural languages. FOCUS' ability to link individual data fields in separate files lets users access their information quickly and easily, while limiting data file dependence and data redundancy. But that's not all . . .

It's quick to learn . . . programmers and non-programmers can learn to make basic queries within hours, write formatted reports within a day, and develop complex, self documenting applications after two days of training.

It's complete and versatile . . . FOCUS answers user queries, writes reports, develops complete applications, and provides graphs, financial models and formal statistics. FOCUS couples with your current files (QSAM, VSAM, IMS, IDMS, etc.), and its own DBMS provides for full screen data entry and transaction processing.

It's used on-line . . . FOCUS operates interactively (VM/CMS, TSO/MVS, CICS) on IBM 3000s, 370s, 4300s, or equivalent mainframes.

It has many users . . . over 400 major companies, institutions and government facilities are using FOCUS, including: RCA, J.C. Penney, ITT-Continental Baking, Home Box Office (HBO), Yale University, and the U.S. Army Corps of Engineers. Typical applications are in personnel, finance, general administration, marketing, sales, research, manufacturing, and customer service.

Let FOCUS star for you. For more information call or write for our brochure.

FOCUS
Information Builders, Inc.
1250 Broadway
New York, N.Y. 10001
(212) 736-4433

(FOCUS is also available on a service bureau basis through Tymshare Inc.)

THE SCHEDULER™

SAGA OF A MODERN WORKHORSE

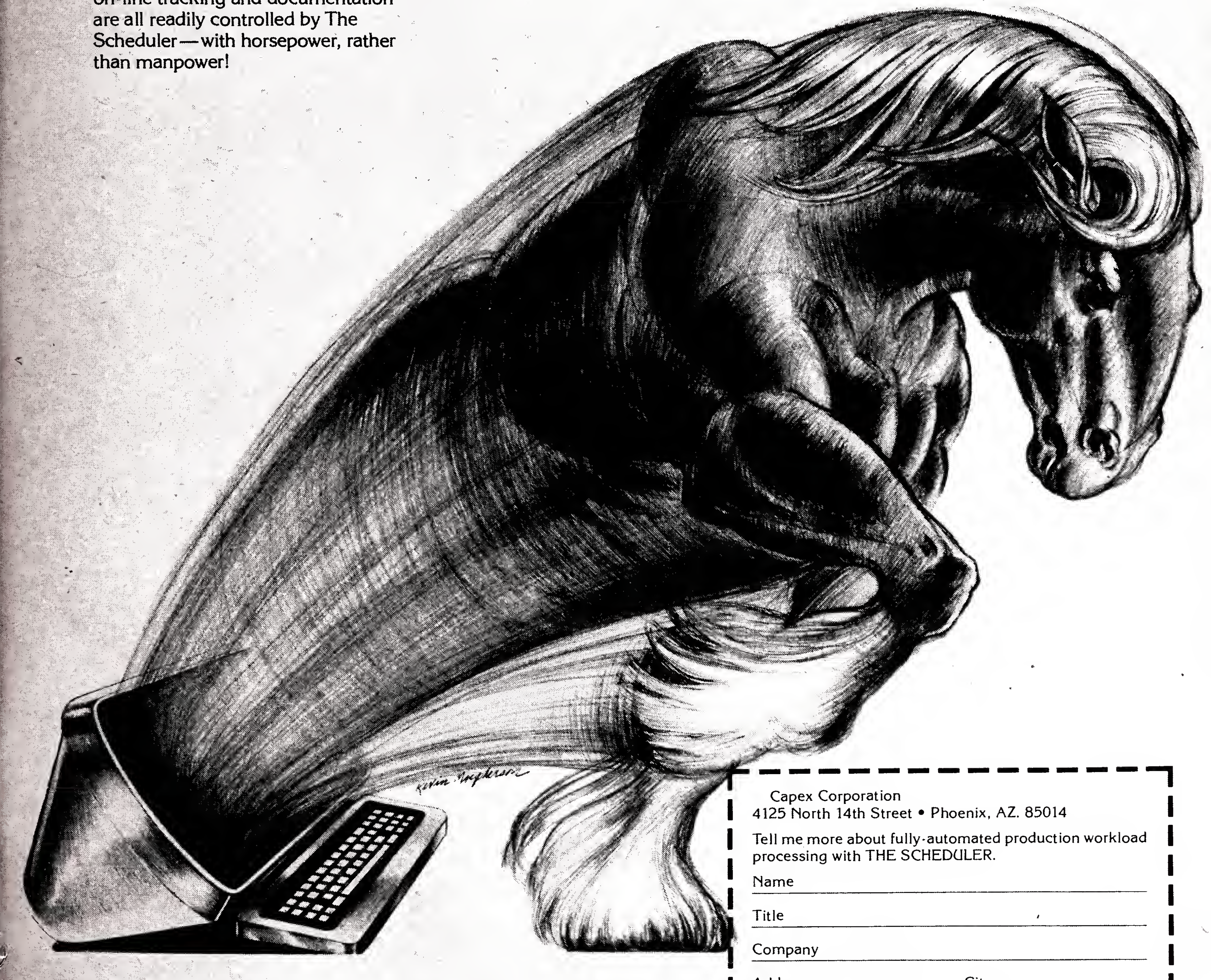
The Scheduler.™ A modern workhorse and a proven product that **fully automates** the time-consuming process of scheduling your production workload. The result is unparalleled improvement in the production environment.

The Scheduler enables you to plan, organize, and control your entire workload. It eliminates manual, error-prone, time-consuming tasks that severely limit overall productivity. Data center scheduling, production control management, workload-resource simulation, on-line tracking and documentation are all readily controlled by The Scheduler—with horsepower, rather than manpower!

The Scheduler is straightforward, understandable, and simple to use. No product currently available for the IBM OS/VS environment does more to provide a standardized level of service for operations managers.

The Scheduler **is** the modern workhorse for progressive data centers and the latest addition to Capex's family of effective operations products. Mail the coupon or call Capex today at (602) 264-7241 for detailed information.

capex
CORPORATION
4125 North 14th Street
Phoenix, Arizona 85014



Capex Corporation
4125 North 14th Street • Phoenix, AZ. 85014

Tell me more about fully-automated production workload processing with THE SCHEDULER.

Name
Title
Company
Address City
State Zip Phone

K-7

Atlanta (404) 451-8415 • Boston (617) 329-6170 • Chicago (312) 986-8618 • Dallas (214) 484-4260 • Los Angeles (213) 862-5102 • New Jersey (201) 472-7000 • New York (212) 239-8840 • Philadelphia (215) 337-8050 • Phoenix (602) 264-7241 • San Francisco (415) 397-8140 • St. Charles, MO (314) 946-3737 • Sterling, VA (703) 430-0550 • Washington, D.C. (301) 596-3335 • Other offices in Amsterdam, Dusseldorf, Munich, Paris, Lyon, London.

Prime Adds 32-Bit Supermini to 50 Series

(Continued from Page 1)

streaming concept and expand upon the multiuser facilities of the firm's Primos operating system. The system is made up of three major components: two instruction stream units (ISU), each divided into three preprocessing and data handling subcomponents; and a stream synchronization unit (SSU), which performs such functions as data validation, memory access synchronization and internal diagnostics.

Each ISU has an instruction preprocessor unit that is said to improve CPU performance by prefetching and decoding instructions from each ISU's 16K-byte bipolar cache memory. Together, the ISUs provide the 850 with 32K bytes of cache memory, twice as much as the previous high-end 750. In addition, the system's double cache provides a 95% hit rate on processor data requirements, the spokesman added.

The 850's SSU has direct access to the system's memory bus and validates any information in each ISU's cache memory, while at the same time managing any internal messages that flow between the two ISUs.

Other system features include a burst-mode I/O that provides a high-speed transfer rate of 8M byte/sec and transfers 64 bits of data per request; and hardware-implemented instructions for such things as floating-point arithmetic and character string operations.

Although the 850 offers the same performance as the 750 and roughly the same as the VAX-11/780 when executing a single program, the system's throughput dramatically accelerates when additional and simultaneous programs are injected into the computer's operation. For instance, in a "test spin" demonstration held at the company's new headquarters here last week, the 850 proved to have twice the performance as its predecessor when pitted in a program-for-program showdown.

Running "computer-intensive" Cobol programs, both machines took about 11 seconds to run a single computer program. However, when a second program was added to each computer and run simultaneously, the 850 clocked in at about 11.5 seconds and the 750 finished in about 22 seconds. The gap widened even further when 10 programs were run on each system at the same time. The multistreaming 850 finished its run in around 56 seconds, while the 750 "lumbered" across the finish line nearly a minute and 49 seconds later.

Prime raced each machine around the computer track to demonstrate the 850's ability to perform in such high-throughput areas as computer-aided design and manufacturing and computer simulation applications.

While the firm did insist that the 850 had twice the performance of the VAX-11/780, officials at the press conference admitted that estimates were compiled with the Prime 750 and no benchmarks had yet been run on the DEC computer.

As part of its 50 series enhancement, the firm phased out the systems 450 and 650 — both described as popular machines with a large user base — and added Mod-II improvements to the 150, 250 and 550 systems. The 150-II and 250-II now have 70% more performance and can handle 32 — or twice as many — terminals as the previous 150 and 250 models, at a cost increase of about 5% to 10% more, the spokesman pointed out.

The 550-II now has four times as much cache memory as its previous systems shadow — 8K- instead of 2K bytes — and twice as much memory. In addition, the system has decimal floating-point arithmetic and character string operations in hardware, rather than microcode, and has 35% greater performance than its predecessor. The cost of the 550 with the Mod-II enhancement is about 5% more than the older version.

Finally, to satisfy current 750 users, the firm boosted the number of terminals the system can handle from 64 to 96.

All of the systems in Prime's new systems line-up — the 150-II, 250-II, 550-II, 750 and 850 — support Fortran, Cobol, PL/I, Pascal, Basic and RPG-II, as well as the company's data base management system.

The 850 is scheduled for delivery this summer and is typically priced at about $525,000 for a system with 4M bytes of memory, a 300M-byte disk drive, a tape drive, 600 line/min printer, networking hardware and software, 20 terminals and necessary software. The 150-II and 250-II cost about $86,000 for systems with 1M-byte of main memory, while a 550-II sells for about $190,000 for a typical system, and the boosted 750 is priced at $320,000.

Deliveries for these enhanced systems are scheduled for the second quarter of 1981, the spokesman said.

Prime is located at Prime Park, Natick, Mass. 01760.

Tandem Adds Nonstop II With Extended Architecture

(Continued from Page 1)

eight times more physical memory and several times more X.25 virtual communications circuitry than Tandem's existing systems line, the Nonstop I.

More specifically, Nonstop II accommodates I/O transfer blocks as long as 64K bytes, physical memory as large as 16M bytes and "several hundred" X.25 virtual circuits, the spokesman said. Nonstop I, by contrast, supports an I/O transfer space of up to 4K bytes, a maximum physical memory of 2M bytes and 40 to 50 virtual circuits per processor.

Because of its increased number of virtual communications circuits, Nonstop II accepts up to 32 I/O controllers and 256 I/O peripherals per CPU pair. The system's I/O channels operate at up to 5M byte/sec.

By extending its hardware architecture and addressability, Tandem is reportedly enabling users to create much larger communications networks and data bases than would otherwise be possible with the firm's existing Nonstop product line. This increased hardware expansion capability will soon prove crucial for many of the company's customers, whose Nonstop I resources are rapidly being exhausted by their steadily growing demand for on-line applications, the spokesman said.

Although it costs 12% to 20% more than a typical Nonstop I configuration, Nonstop II provides an average of 50% better price/performance than the original Tandem system, the source added.

Like the older Nonstop I, Tandem's latest systems line is optimized for on-line, transaction-processing applications requiring uninterrupted CPU availability as well as hundreds of terminals, communications lines and large, geographically distributed data bases.

As for their other common technological traits, both the Nonstop I and II expand from a minimum of two processors to a maximum of 16 and can operate in a communications network consisting of up to 255 nodes and a total of 4,080 CPUs.

In addition, the two systems are hardware-, software- and network-compatible with each other. A current Nonstop I user can upgrade to a Nonstop II without having to rewrite application programs or discard existing peripherals and controllers, the spokesman said.

Built around a 22-bit, 100-nsec processor, the Nonstop II is equipped with an enhanced, 400-nsec memory subsystem. At present, Tandem is limiting its maximum main memory expansion to only 2M bytes. But the company's 32-bit data access architecture can accommodate up to 16M bytes per processor, and as higher density storage chips become cost-effective, users will be able to expand beyond the current 2M-byte limit in 512K-byte increments, the spokesman explained.

Although Tandem will continue to manufacture and support Nonstop I, the company is offering an exchange agreement that gives users a financial incentive to upgrade from their existing hardware to a Nonstop II system. Under the agreement, customers can return their original equipment and, in exchange, receive credits that can be applied toward the purchase of a system upgrade.

A minimum Nonstop II configuration consisting of dual 512K-byte processors, an OSP and a tape system with controllers costs $144,475 and has a 120-day delivery lead time. Tandem can be reached at 19333 Vallco Parkway, Cupertino, Calif. 95014.

For the non-computer professional—

The New English language Information Control System Every Data General user must have!

SUPERENGLISH™ IX

Functions:
- Establish Data Base
- Use existing data
- Manipulate information
- Produce reports and graphs on any information, using your own format

Example:
- Mailing lists
- Sales reports and analyses
- Special inventory
- Pro forma statements

AQI
AUTOMATED QUILL INC.
3501 So. Corona St., top floor
Englewood, Colorado 80110
303/761-2722

Introductory Offer! 25% **Discount from list price to first 25 purchasers!**

User Turns Vendor

Insurance Firm Breaks Into Series/1 Sales

By Marcia Blumenthal
CW Staff

HARTFORD, Conn. — One of the country's largest computer users has become a computer systems vendor.

In a contract signed with IBM on April 9, Aetna Life and Casualty Co. agreed to sell more than 1,000 IBM Series/1 minicomputers to its independent insurance agents by 1985.

Although company executives were unavailable to discuss Aetna's strategic motivation for jumping into computer sales, industry observers noted that by offering a complete stand-alone agency management system that will eventually tie into its host computers, Aetna would have an edge over competitors.

The key to the move was acquiring exclusive rights to an agency management software package developed by McCracken Computer, Inc. of Lexington, Mass., noted Nick Beram, a DP administrator at Aetna, who will oversee the company's implementation of the venture. That package was already running successfully on the Series/1, Beram said.

Terms of Contract

The contract for Series/1 hardware calls for Aetna to purchase as much as $70 million worth of IBM equipment. Aetna and IBM are partners in Satellite Business Systems along with Comsat General. In selecting its hardware options, Beram said Aetna looked at other vendors, but based its purchase decision upon interviews with Series/1 users who found that system was highly reliable.

For the Gemini system, Beram said, a typical agency hardware configuration will consist of the processor, a diskette reader, 64K bytes of disk storage, 5 CRTs and a letter-quality printer. The turnkey system will be sold to Aetna's independent agents and other interested agents for between $35,000 and $55,000.

Aetna will maintain and update the software and do remote diagnostics, referring all hardware problems to IBM for maintenance. The company is using a Series/1 in-house which can log on to all field machines and determine the nature of any detected operating problems.

Aetna has set up a separate department for the turnkey sales venture, which Beram estimates will consist of 20 people in the near future.

Although the system will be shipped as a stand-alone starting in August, Beram said the company is developing an interface that will permit the Gemini systems to communicate with the company's host systems. The telecommunications feature is considered a key to the system.

To develop this interface Aetna is drawing upon its in-house DP talent. Aetna has several DP units, one for each of its major insurance products — group, life and casualty. In addition, the company has corporate DP departments which work on operating systems, research and networking, among other projects. This unit is the one primarily developing the interface unit.

This communications capability will be added to the system during the fourth quarter, Beram said.

As planned now, Gemini users will send transactions to an interface machine, essentially a communications controller running under IBM's CICS, which will forward those transactions to the host systems. This method was chosen because it may be necessary to format transactions initiated on the Series/1 in a different format than is used for the host.

Pilot Tests

Currently Aetna is running pilot tests of the Gemini system in seven independent agencies in Connecticut, Massachusetts, New York and Pennsylvania. These pilots have been instrumental in allowing Aetna to learn what accounting enhancements will be needed to make the machine attractive to insurance agents.

The Gemini software is standardized and performs accounting, marketing, invoicing, word processing and other business functions. Aetna said within two years the system will be able to communicate with other major insurance companies to perform claims processing, billing and policy servicing.

Aetna has not yet finalized the method for marketing the systems, but it is expected to be handled through the company's 67 field offices.

Moreover, by year-end Aetna expects to arrange to also sell the system through a third party vendor, a spokesman for the firm said.

Correction

The Association of Human Resource Systems Professionals will be presenting "Resource Systems for the '80s" May 18-20 in Berkeley, Calif. [CW, April 13]. Further information is available from Sid Simon, Bechtel Power Corp., 50 Beale St., San Francisco, Calif. 94105.

Automatic Backup & Recovery

- Incremental Backup of Datasets
- Archive Inactive Datasets
- Automatic Volume Reconstruction
- Dynamic Allocation of Disk Space
- Migration Between Unlike Devices
- Automatic Tracking of Backup Tapes
- Complete Volume & Dataset Reports
- Free 30 Day Trial — IBM OS, VS & MVS

ABR provides an efficient and easy to use method of managing the space on direct access volumes. Disk volume and dataset backup can be automated based on last reference date and update characteristics. Datasets which have not been used for a time period can be automatically archived, freeing the disk space for more productive use.

INNOVATION
DATA PROCESSING
970 Clifton Ave., Clifton, NJ 07013 • 201-777-1940

MEMBER datapro SOFTWARE HONOR ROLL

'Columbia' Launch: Pomp and Thorns

By Tim Scannell
CW Staff

KENNEDY SPACE CENTER, Fla. — For thousands of people attending the first launch of the space shuttle *Columbia* last week, the event generated deep-rooted feelings of pride, patriotism and space-age camaraderie. For others, however, the feeling was slightly less euphoric.

Without a doubt, the site of *Columbia* jutting majestically up against the night sky was an awesome and inspiring spectacle. The launch pad itself was illuminated by the world's most intense floodlighting system — developed for the Apollo 8 launch in 1968 — which generated beams that rivaled one billion candles and could be seen 50 miles away.

And the disembodied voice of Hugh Harris booming out over the National Aeronautics and Space Administration (Nasa) complex and into the surroundings of the Merritt Island National Wildlife Refuge further instilled an "I am there" sense of history.

However, there were a number of thorns thrown in with shuttle pomp and certainly a lion's share of uncomfortable circumstances.

Although some of the more than 3,500 press and more than 80,000 officially credited people who crowded into the media viewing area and surrounding grandstands had the foresight and the editorial permission to arrive days ahead of time, a number of reporters, including *Computerworld*'s representative, breezed in hours before the morning's scheduled launch. Needless to say, this created some monumental problems.

First of all, there were close to a million people crowded into the 72- by 20-mile area known as Brevard County. So, in order to get to one of several Nasa checkpoints to prove your accreditation, you had to wade through hordes of frisbee-throwing, camper-riding space enthusiasts who blanketed the narrow access roads.

Upon reaching the first checkpoint, it is at least a 10-mile drive to the press area along roads that wouldn't know a street lamp if they saw one and were occasionally dotted with directional signs that screamed for a new coat of paint. Life is obviously tough when you're trying to stick within a government budget.

The press area, resembling a behind-the-bleachers scene at a sellout ball game, was a mass of winding cables, angrily humming generators and hastily parked trailors. Naturally, network television had prime positions. In fact, the three big leaguers — ABC, CBS and NBC — had erected their own glassed-in viewing towers suitable for the likes of Dan Rather and Frank Reynolds.

Media Event

As expected, the networks were in their element and did an admirable job of covering the media event. There was one minor problem, however, stirred up by reporting aired by Frank Reynolds and ABC. It seems that later on in the day, when problems with the shuttle's computers occurred, Reynolds kept referring to the main computer as the "prime" instead of the primary machines. Within minutes, Prime Computer, Inc. in Natick, Mass., was on the telephone to ABC advising its No. 1 anchorman to be more wary of his terminology.

While most people slept away the early hours in trailors or in nearby Cocoa Beach, where some hotels had conveniently sextupled their rates to accommodate last minute viewers, many slept outdoors under the stars and others grabbed a few hours sleep in an overly air-conditioned Nasa press room.

Actually, it was better to fight off sleep and stay up all night rather than contend with the swarms of elephant-like mosquitoes outside.

If you weren't content to watch television images of the shuttle resting on pad 39A, then a second six-foot screen television was available where Johnny Carson and reruns of *Battlestar Gallactica* — a science fiction series — played through the night.

As countdown neared, however, most people forgot about the mosquitoes and the dragging hours of predawn insomnia. They accepted the fact that Nasa provided a 30-seat bus to accommodate 3,500 reporters and even laughed at the fact you couldn't see or talk to anyone of influence unless you were on one of hundreds of hard-to-find lists.

The scrubbing of Friday's launch due to a computer problem was a disappointment, but as Nasa fiddled with the software aboard the shuttle, most people managed to amuse themselves by wandering in and out of the celebrity-filled stands. Photographers kept themselves busy by adjusting long-lensed cameras and taking photographs of each other like children at a summer camp.

The crowning glory of the whole affair finally came Sunday morning at about three-minutes past seven when *Columbia* sliced through the sky and into the clouds. The rapidly ascending ship could be seen from hundreds of miles away and wave upon wave of noise from its Saturn V and booster rockets shook buildings miles from the launch site.

The whole thing was over in little more than six seconds, but if given the chance I would bear all the hardship and do it all again.

1981
IMPORTANT MATTERS THIS WEEK
Productivity!!
MONDAY
TUESDAY
WEDNESDAY
INTEGRATED DATA DICTIONARY
PLEX
TAPS/80
SYSTEM 2000 80 DBMS
QUEST
QueX
Report Writer
Intel's Information Resource Management Seminar

Intel's IRM Seminars: the productivity investment you've been banking on.

Tap into a wealth of productivity solutions, compliments of Intel.

Intel's Information Resource Management (IRM) product family is the productivity investment you've been waiting to make. Our nationwide seminars will be focusing on the hands-on productivity solutions we've tailored for you in the eighties.

Intel uniquely applies Information Resource Management to give you product solutions within a complete context. The benefits of Integrated Data Dictionary and advantages of data base management are fully outlined, and we don't stop there. Intel's IRM seminars address the issues of application, end-user and organizational performance, laying out solutions and product benefits.

THREE HOURS.

Consider three hours filled with the how-to's of optimizing your information-based productivity. We focus on gaining efficiencies in application development and end-user access, as well as maintenance and security considerations. SYSTEM 2000®/80 DBMS alone offers the plus value of added-component capabilities.

If you're looking for a productivity pay-off that nets you considerably more than you've put in—and one that yields significant return on investment—join us at any of the seminars listed on our schedule.

RSVP

Take the time now to make the productivity investment you need to cinch the eighties. Call Intel's Market Information Office at 512/258-5171 with the details for your attendance. Or, simply return the invitation for reservations.

Seminar Dates and Cities

Albany, NY	April 15
Atlanta, GA	May 12
Baltimore, MD	May 19
Birmingham, AL	June 9
Boston, MA	May 12
Buffalo, NY	May 20
Calgary, Canada	June 22
Charlotte, NC	June 9
Chattanooga, TN	May 19
Chicago, IL	May 20
Cincinnati, OH	June 10
Cleveland, OH	May 21
Columbus, OH	June 10
Dallas, TX	April 28
Denver, CO	July 8
Des Moines, IA	May 22
Detroit, MI	May 22
Ft. Lauderdale, FL	April 29
Greensboro, NC	May 12
Hartford, CT	May 20
Harrisburg, PA	April 15
Houston, TX	April 22
Huntsville, AL	June 10
Indianapolis, IN	April 21
Jacksonville, FL	May 26
Kansas City, MO	April 9
Knoxville, TN	May 20
Los Angeles, CA	June 16
Memphis, TN	April 22
Minneapolis, MN	June 11
Montreal, Canada	June 16
Nashville, TN	April 21
Newark, NJ	June 2
New York City, NY	May 13
Norfolk, VA	June 9
Omaha, NE	June 11
Orlando, FL	April 28
Philadelphia, PA	June 9
Phoenix, AZ	July 1
Pittsburgh, PA	June 11
Portland, OR	June 10
Providence, RI	May 26
Raleigh, NC	May 13
Richmond, VA	May 19
Roanoke, VA	May 20
Rochester, NY	May 19
Salt Lake City, UT	July 9
San Francisco, CA	June 19
Seattle, WA	June 9
St. Louis, MO	April 8
Syracuse, NY	April 14
Tampa, FL	June 16
Toronto, Canada	June 9
Tulsa, OK	July 14
Washington, D.C.	April 15
White Plains, NY	May 12

I want return on three hour's worth of investment at Intel's IRM seminar in ____________
Location
on ____________
Date
Computer/Operating System ____________
Teleprocessing Monitor ____________
Name/Title ____________
Company ____________
Address ____________
City ____________
State ____________ Zip ____________
Phone ( ) ____________

Mail to Phyllis Shockey/Market Information Office
Intel Systems Group/(12675 Research Boulevard)/P.O. Box 9968/Austin, Texas 78766

intel delivers solutions

Communications Mismatch Still a 'Columbia' Mystery

(Continued from Page 1)

last Tuesday to make a perfect landing on a dry lake bed at Edwards Air Force Base in California.

While the computers were programmed to handle the shuttle's 175-mile one-hour drop from space and 22-degree one-shot glide through the narrow landing corridor, Commander John W. Young took over the craft's controls seconds before touchdown, bringing *Columbia* in for a perfect landing.

However, as kudos and congratulations echoed from around the world, applauding America for writing a new chapter in aviation history, a National Aeronautics and Space Administration (Nasa) task team feverishly tried to unravel the mystery of why the fifth on-board backup computer failed to communicate with at least two of the primary systems just minutes before launch time.

Although Nasa officials had determined what the problem was — a communications error in the operations software that had the backup computer sending data to the primary systems about 41 msec before the computers were ready, according to shuttle deputy program manager, Arnold D. Aldrich — at press time they had not found exactly why the problem had occurred.

Officials at the launch site on Friday — the originally planned day of *Columbia*'s liftoff — insisted that while the computer glitch did cause the mission to be pushed back two days, it would not have jeopordized the lives of the astronauts if the error had occurred after the launch from the Kennedy Space Center.

In the early days of the shuttle, when the craft was merely a gleam in an engineer's eye, Nasa opted for a redundant computer system to allow for the possibility that something might go wrong either with the hardware or the extensive software.

The five 55-pound aviation computers on-board the shuttle are all programmed with identical information and are designed to act in a democratic fashion. That is, if one computer decides to send commands to the craft that differs from the data contained in the other three, the majority rules. In the event of a two-two tie, the fifth backup computer comes into play and makes the final decision.

CW Photo by T. Scannell

Mary Bubb, one of thousands of reporters at the scene, made no effort to hide her enthusiam.

A sixth IBM computer, identical to the five already installed on *Columbia*, was added on-board just hours before liftoff. Designed to act as an "if-all-else-fails" last resort, this computer can be activated by shuttle pilot Capt. Robert L. Crippen and contains a series of "come home" programs that direct *Columbia* to a safe landing [CW, April 6].

The four primary computers, each containing about 106K words of memory, were programmed by IBM with roughly 500,000 lines of code. However, the fifth backup computer was reportedly programmed by Rockwell International Corp. — a point that raised eyebrows and questions among the thousands of reporters, technicians and space shot aficionados at the launch site.

In answer to questions asked about the possibility of a mismatch of programs caused by the dual-vendor relationship, Nasa officials defended the practice as yet another way of checking and balancing the electronic systems of the space shuttle.

Synchronization Snafu

At one point during the delayed launch, as the trailer truck-sized clock positioned on a stretch of land to the west of the aptly named "Mosquito Lagoon" glowed a holding time of T-9 minutes, Hugh Harris, the "Voice of Shuttle Control," announced that the portion of software in the backup computer that was apparently the source of the trouble had not been run through any kind of simulation.

During this time, which was about 9:45 a.m. Friday morning, technicians at the Johnson Space Center in Houston were frantically trying to simulate the synchronization problem on shuttle simulators as well as on a series of IBM mainframes.

However, after two attempts, Nasa officials at Houston were unable to duplicate the communications error.

At this point, as Shuttle Control set the clock back to a holding time of T-20 minutes, other noncomputer problems began cropping up in the already fading launch picture. The inertial measurement unit (IMU), which is a necessary part of preflight alignment of the space shuttle, was decreasing and had to be reconfigured for a new launch time. In addition, *Columbia*'s "launch window," which provides a veritable highway into space and only lasted for about six hours, was fast closing.

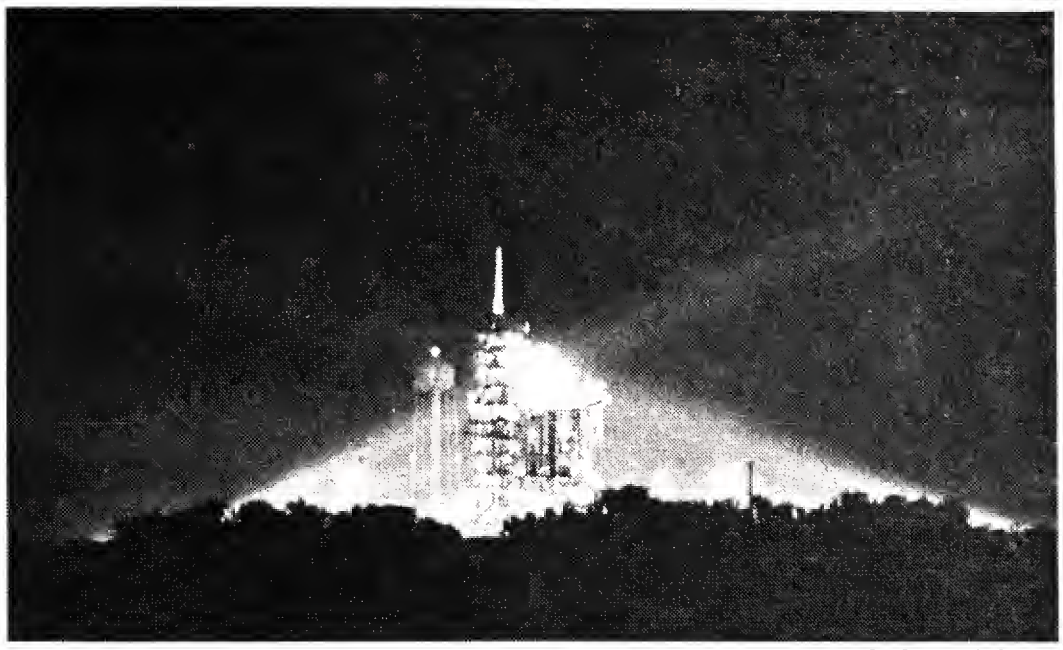
Finally, and perhaps most importantly, Crippen and Young — who had risen at around 2 a.m. that morning — were becoming fatigued and physically uncomfortable from lying in a horizontal position for such an extended period of time.

Initial Problem

Nasa technicians will undoubtedly find exactly what caused the communications mismatch among the five computers before the next launch of the reusable space shuttle in about six months. However, a number of critics claim that the shuttle's initial computer design is to blame for the synchronization snafu.

For one thing, the five IBM computers on-board the shuttle were constructed during the 1970s when the shuttle was being planned and do not incorporate state-of-the-art technology. And a number of academicians, knowledgeable in the intricacies of redundant or fault-tolerant computing, insist that it might have been better to have a single processor with internally redundant parts.

Despite these criticisms, Nasa officials maintain that the shuttle's electronics and data processing facilities are the most sophisticated that could be found, and still keep within the shuttle's budget and launch time frame.

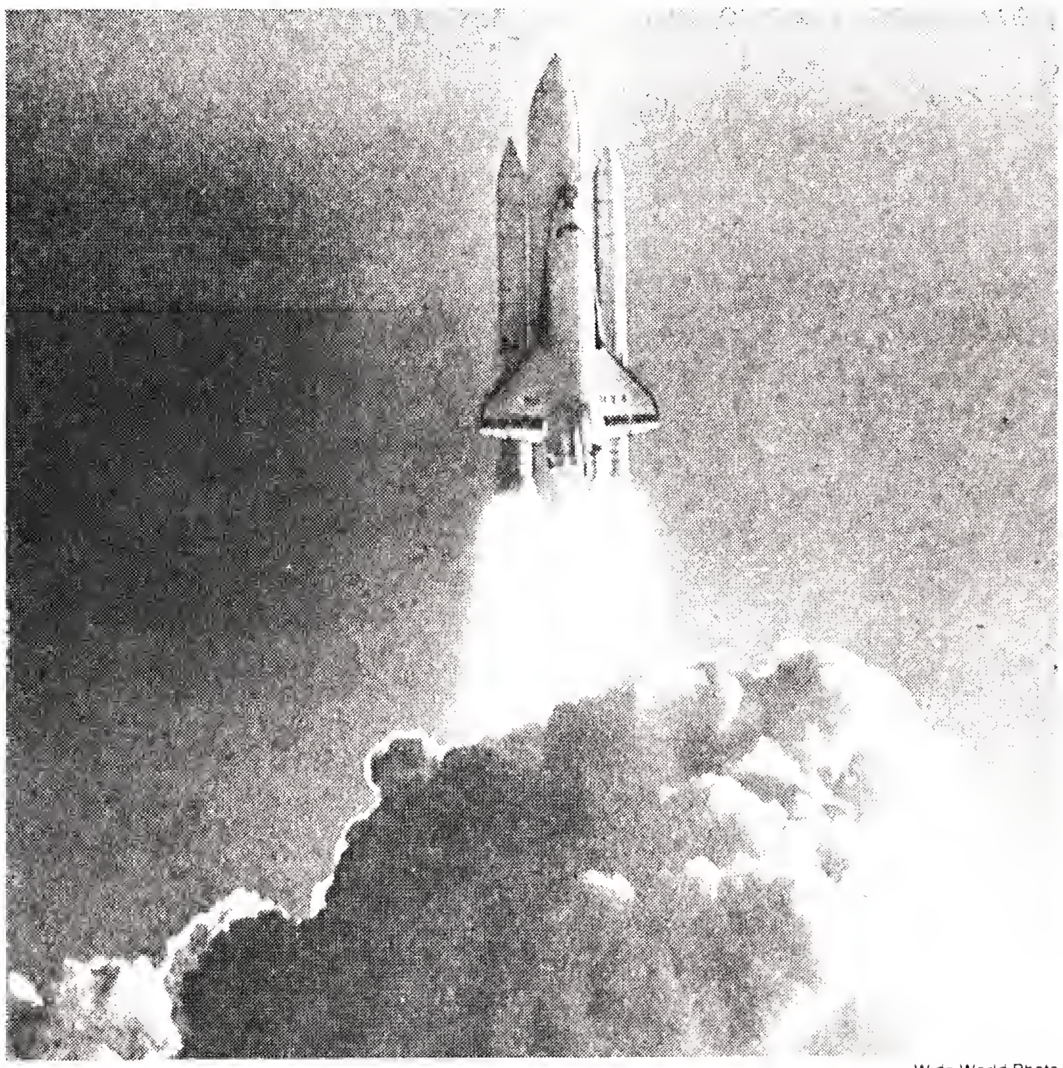


CW Photo by T. Scannell

Hours before launch, a floodlit *Columbia* sits poised for liftoff . . .

CW Photo by T. Scannell

At T-20 minutes and counting, crowds of reporters headed for the shoreline at the space center for a better view of the blastoff, only to be told that a computer problem had delayed the launch. But 48 hours later . . .



Wide World Photo

. . . The *Columbia* roared off into the early morning sky.

GE Moves Full-Force Into Factory Automation

By Bruce Hoard
CW Staff

NEW YORK — General Electric Co. signaled its full-force entry into the automated manufacturing market here when it announced the formation of an automation systems business that will market robots and automated factory systems.

The company further bolstered its automated manufacturing credentials by purchasing the Calma Co., manufacturer of computer-aided design (CAD) systems, and Intersil, Inc., producers of microprocessors, data acquisition circuits and semiconductors.

Although word of GE's move toward robotics had been rumored since last July, the company made it official on April 2 by describing its nonexclusive worldwide production and marketing rights for the Italian-made DEA Co. Allegro robot.

GE has exclusive rights to Allegro unless DEA decides to market the robot on its own.

The manufacturer will expand its robotics offerings to include its own proprietary models by the mid-'80s, according to Julius A. Mirabel, general manager of the new group. The company will also license robots from other vendors, a spokeswoman said.

"The North American robots systems market alone is widely expected to have constant dollar growth from the mid-$60 million in 1980 to in excess of $500 million by 1985 and $1.5 billion by 1990," Mirabel noted.

Factory of the Future

The acquisition of Calma paves the way for GE to develop a fully automated "factory of the future." Calma's capabilities will be used to design and analyze products in the first step of the automated assembly process.

From there, the design would be passed from the Calma computer to a GE machine that numerically controls machine tools. The machine tools will then take the parts and pass them on to lasers for welding and/or robots for assembly.

Next, a GE electronic camera will inspect the finished product and report its findings so that bugs can be eliminated. Finally, a GE computer network will track inventory, ensuring proper stocks.

Experts from three leading robot manufacturers expressed tentative opinions about GE's move, allowing that it could lead to direct competition with their companies.

Lyle Harbin, director of marketing for the Industrial Robot Division of Cincinnatti Milacron, Inc., was reluctant to predict how Allegro would affect the competetive balance of the burgeoning robotics market.

"It's a little early to get a feel; I really don't know what GE's plans are," he said, adding, "It appears to me they have an overall plan, but they're only announcing a portion of it."

Will the new robot provide direct competition for Cincinnatti Milacron's products? "I don't think so at this time, but I'm sure they will later," he observed.

The addition of Allegro to the market will actually benefit Unimation, Inc., according to its sales manager, Mortimer Sullivan. He reasoned that GE's increased commitment to automated manufacturing will expand the total robotics market and strengthen the already favorable relationship between the two companies.

"They've been favored customers of ours in the past, and I think they will remain favored customers in the future," he declared.

Victor Scheinman is vice-president of advanced systems for Automatix, Inc., and the inventor of Unimation's Puma (programmable universal machine for assembly) robot. Robot manufacturing is really nothing new for GE, he declared.

GE reached $3 million in yearly sales from its manually operated Man Mate robots at one time, he claimed. And the company has also produced a limited number of computer-driven robots, he added.

Asked about the effect Allegro would have on the competitive balance of the robotics market, he said, "I don't think it will affect it for at least a year or two," the reason being Allegro is more expensive than its putative competitors and offers nothing new in the way of capabilities, according to Scheinman.

The microprocessor-controlled Allegro has a sense of touch, so it can react to missing components or recognize and reject substandard parts, a spokesman said. Its coordinated multiple arms can repeat the same motions to within one one-thousandth of an inch, he added.

A typical system will contain an Intel Corp. 8080 microprocessor controlled by a Digital Equipment Corp. PDP-11/04 minicomputer. The cost of that system will range between $100,000 and $175,000, depending on such variables as number of arms (up to four are available), who writes the software and the tasks to be performed.

GE has made heavy use of robots in the past, but played down its commitment to them when it was reported up to 18,000 assembly workers could be laid off because of them.

"We are accepting Allegro orders now for delivery late in 1981 and early 1982," Mirabel said.

What you don't know about

ISC '81
The Invitational Systems Conference on Word Processing and Data Processing

ISC '81 Combines User Wisdom With Vendor Expertise

April 23-24, at the Rye Town Hilton, Westchester County, New York
Reserve a seat now! Call 1-800-225-4698

This is a conference with a difference, brought to you by the **CW Conference Management Group**, the people who bring you *Communication Networks.*

Vendors but— no booth-hopping!

You'll get the best aspects of conventional exhibit and conference programs—without the headaches. You won't have to go booth-hopping between sessions to see the latest in equipment advances—you'll get scheduled demonstration sessions with four top vendors: **DEC, AB Dick, Royal Business Machines** and **Lanier Business Products.**

Basic and Advanced Sessions

You'll get a choice between Basic and Advanced sessions designed to meet you where you are and take you on to the kind of experience you need to take the lead in office automation procedures.

Speakers and Schedule for Basic Sessions on April 23

The Basic Sessions deal with everything from the need for word processing to cost justification through getting underway, implementing, office communications and management and control for day-to-day operation.

Walshe
Basic Sessions on the first day will be chaired by Willoughby Ann Walshe, executive editor, *Word Processing Information Systems* magazine and *Information & Word Processing Report* newsletter, published by Geyer McAllister, N.Y.C.

Additional speakers include:

Feidelman
Lawrence Feidelman
President
Management Information Corporation

Sylva
Steven Sylva
Manager, Interactive Service Division of Management Information Services
Commercial Union Insurance

Sylvia Courtney
Office Automation Manager
Commercial Union Insurance

9:00-10:00
First Steps in Word Processing
A discussion of the productivity problems in organizations using standard office equipment and how to improve personnel efficiency with new technology. You will get an emphasis on the latest trends, strategies, and problems in planning automated offices.

10:15-11:15
Surveying Word Processing Equipment
A survey of the latest in basic word processing equipment and software packages and the definitions, capabilities and limitations of each. You will learn how to evaluate and adapt such equipment to your needs.

11:30-12:30
Vendor Session
Special demonstration session with one of four leading vendors of the latest WP/DP equipment. You may ask questions, get solutions to problems and try out equipment.

12:30-1:30
Luncheon

1:45-2:45
Getting Word Processing Underway
You will get help on every aspect of getting word processing systems in place from identifying bottlenecks in your office to evaluating vendors. You'll learn the strengths and weaknesses of word processing equipment, how to get management commitment and how to work with consultants.

3:00-4:00
Vendor Session

4:15-5:15
Cost-Justifying Word Processing
You'll learn the basics of selling management on word processing from determining the benefits and measuring productivity improvements to defining real and hidden costs and predicting future applications. You'll get expert advice on developing a presentation.

5:15-6:30
Informal Networking
Enjoy a glass of wine and mingle with your colleagues, session leaders and vendors.

Speakers and Schedule for Basic Sessions on April 24

Eisen
The second day chair of the Basic Sessions is Jerrold B. Eisen, president of Offices Sciences International, Inc., a subsidiary of Communications Sciences Inc.

Additional speakers include:

Maskovsky
Gerald Maskovsky
Director
The Office of the Future
Coopers & Lybrand

Lovit
Herb Lovit
Chairman of the Board
Communications Sciences, Inc.

Reino
Patricia Reino
Manager, Administrative Support Services
Olin Corporation

9:00-10:00
Vendor Session

10:15-11:15
Implementing the Plan
You'll begin with a definition of strategic planning and proceed with assessing the human aspects of planning—personnel considerations, staff selection and training programs. You'll learn through the use of case studies demonstrating the relationship of planning to successful implementation.

11:30-12:30
Vendor Session

12:30-1:30
Luncheon

1:45-2:45
Communications in the Office
You'll get the facts on communications transfer from terminal to terminal or terminal to computer aiding inter- and intra-office communications. You'll learn the issues, problems and solutions of mixed vendor equipment: what communications options are available; how to plan a word processing network and how communications is the first step in electronic mail.

3:00-4:00
Management and Control of Word Processing
You'll learn how to handle the crucial challenge of overseeing the day-to-day operations of the system. You'll hear how to establish work flow procedures; how to train and supervise staff; how to set standards and goals; how to measure and evaluate WP personnel and how to perform cost control and budgeting functions.

4:00-5:00
User/Vendor Wrap-Up Session
Potential users, users and vendors will get an opportunity to discuss the current needs, problems, solutions and technologies for today's office as well as in the office of the future.

Says Value to Economy Ignored

Professor Bemoans Indifference to DP Education

By Marcia Blumenthal
CW Staff

PALM SPRINGS, Calif. — "Most people in the U.S. have no understanding of the value of computing to the economy," charged Robert G. Gillespie, vice-provost for computing at the University of Washington.

This lack of insight makes it difficult to foster increased investment in computing education.

To make matters worse, education in the U.S. is not considered part of the overall planning process for the country's economy, Gillespie told a group of executives gathered here recently for the annual meeting of the Computer and Business Equipment Manufacturers Association (Cbema).

Other societies have recognized the value of information sciences to their economies. In France, for example, the renowned Norr report done by the government was a best seller with more than a half million copies sold.

And the French government in 1979 launched a computer awareness campaign capped by a special Computer Week exhibit throughout the nation [CW Oct. 1, 1979].

Japan will spend an estimated $85 billion to convert from an industrial to an information economy, Gillespie said.

Part of the problem facing the U.S. stems from the long and commonly held view that "intellectual capital was never a limiting factor to economic growth," Gillespie said. In short, most people do not see the dearth of computer education as a problem.

Manpower Shortages

Without government recognition of the importance of computing to education, the U.S. will continue to suffer severe shortages in the manpower required to direct an information intensive society. Department of Commerce statistics show 46% of the gross national product is derived through information activities.

Gillespie participated in a committee of prominent educators that last month presented a consensus statement on computing in higher education to the National Science Foundation (NSF).

The group advocates the establishment of an institute to create a national information policy. "It doesn't make much sense to lobby for higher education in computing unless information policy has some standing in society," Gillespie said.

Such national policy must reflect the views of government, industry and academia. "It must be a joint approach," Gillespie stressed.

The National Science Board, the governing body of the NSF, must take on the task of bringing together the people in society who perceive the lack of computer education as a problem.

Ironically, Office of Management and Budget Director David Stockman has proposed slashing $180 million from the NSF budget, of which $60 million is for science education, including $10 million for computing education.

This cut would exacerbate the already precarious position of computing education.

Today a 10-to-one shortage of master degree computer science personnel exists. And it costs $15,000 to $25,000 to train a Ph.D. in computer science; only half of the 200 annual Ph.D. graduates stream into industry.

Business Grads Needed

However, computer scientists are only one type of computer professional, and these graduates are not going to solve problems in U.S. industry because their specialty is designing things, Gillespie explained.

The other professional sorely needed in companies is the business school graduate with a concentration in information science. However, business schools today are so successful there is no impetus for them to incorporate an information science specialty into their programs, Gillespie claimed.

In addition, standard business courses in accounting and finance absorb all the resources of business schools, a standard pattern around the country, Gillespie observed.

Some institutions like Carnegie-Mellon University and Dartmouth College invest heavily in computer education, but these schools are small and well endowed, Gillespie noted.

Another deep concern of educators is the poor science preparation in high schools. About one third of college freshmen require remedial courses in science, he said. "Most colleges do not have the resources to correct inadequacies of high school education."

This situation exists because high school students are not generally encouraged to pursue careers in science-oriented fields. By comparison, high school level students in the Soviet Union take three to four times the number of science courses as U.S. high school students.

office automation can hurt you.

Speakers and Schedule for Advanced Sessions on April 23

The Advanced Sessions begin with comprehensive work on office automation concepts through problems and solutions and a double session on achieving full integration. There'll be guidance sessions on applications planning, word processing, interface options and even electronic mail.

Martin

Norman M. Martin, chair of the first day Advanced Sessions, is president of his own consulting firm and has 25 years experience with word/information/data processing equipment and systems as well as digital data communications.

Additional speakers include:

Polizzaano

Peter Polizzano
Vice President, Marketing Programs
CompuScan

Eugene Starr
Director of Corporate Development
Ontel Corporation

9:00-10:00
Office Automation Concepts
You'll get a comprehensive discussion on how to assess your company's office automation requirements; how to distinguish between word, information and data processing needs; how to evaluate and set priorities; how to determine the best approach to achieve automation objectives and how to recognize the most common traps—and avoid them!

10:15-11:15
Vendor Session
Special demonstration session with one of four leading vendors of the latest WP/DP equipment. You may ask questions, get solutions to problems and try out new equipment.

11:30-12:30
Problems and Solutions
You'll be given a close look at the problems caused by the inherent incompatibility among various machines and systems, especially when more than one vendor is involved. You'll hear unique methods and approaches to avoid or overcome these difficulties including: Employing digital communications to accomplish a merger of word and data processing applications; maximizing the use of peripheral devices to achieve system integration; detailing the role of facsimile machines, OCR readers, intelligent copiers and similar equipment in automated offices; using "black boxes" and imaginative interfacing techniques to handle phototypesetting and other possible requirements.

12:30-1:30
Luncheon

1:45-2:45
Vendor Session

3:00-4:00
(15-minute break)
4:15-5:15
Achieving Full Integration
In this session you will get details on how to use communications networks to plug gaps that may still remain in the information processing system following the development of a compatible on-site system using the procedures outlined in the previous two sessions.

You will hear discussions on the telecommunications industry describing available and future networks; the relative advantages of value-added, computer-based networks; store-and-forward technology's role in office automation; implementing an in-house communications network and problems with protocol and how to solve them.

You'll get a review of the various types of computerized data bases available to those organizations which have developed the in-house systems capable of accessing these libraries; a discussion of services and a discussion on the importance of planning for the future.

5:15-6:30
Informal Networking
Enjoy a glass of wine and mingle with your colleagues, session leaders and vendors.

Speakers and Schedule for Advanced Sessions on April 24

Greenblatt

Robert Greenblatt, president of National Word Processing, Inc., a firm specializing in the design and implementation of administrative programs to integrate data processing and word processing, will chair the second day Advanced Sessions.

Additional speakers include:

Herb Fried
Systems Officer
Citibank of New York

Joseph Ramellini
Director, Advanced Office Support Systems
CBS, Inc.

Angelo Cappelo
Officer Services Manager
Pepsico Inc.

9:00-10:00
Applications Planning for WP/DP
You will be guided over the background information steps necessary to help you to develop a multitude of applications. You'll hear about the important steps in planning/selecting the analysis team; identifying initial applications; determining cost justifications and high payoff applications; expanding the team and applications. "The software issue, make or buy?" will also be examined.

10:15-11:15
Vendor Session

11:30-12:30
Word Processing Interface Options
You'll get comprehensive information on the word processing interface options available for transferring stored text, data and graphics between locations, as well as a close look at systems and devices such as printers, communications, OCR, COM phototypesetting, ADP, Micrographics and facsimile.

12:30-1:30
Luncheon

1:45-2:45
Vendor Session

3:00-4:00
Electronic Mail via WP/DP
In this session you'll get a discussion on the concepts, technologies, cost justifications, systems and applications of electronic mail with word processing and data processing.

4:00-5:00
User/Vendor Wrap-Up Session
Users and vendors will get an opportunity to discuss the needs, problems, solutions and technologies for today's office and for the office of the future.

Registration Is Fast and Easy

REGISTER TODAY: The Invitational Systems Conference on Word Processing and Data Processing produced by CW Conference Management will be held at the Rye Town Hilton, 699 Westchester Ave., Port Chester, NY 10573, just off the Cross Westchester Expressway (I-287). The conference fee is $295 per person and covers two days of sessions and two luncheons. **For more information or to register call Louise Myerow, Registration Coordinator, on our toll-free number: 1-800-225-4698, ext. 435. In Massachusetts call (617) 879-0700, ext. 435.**

ISC '81
Registration Form

☐ YES! I'm ready for a comprehensive introductory seminar on the basics of word processing and data processing. Sign me up for your two-day BASIC session at $295 per person.

☐ NOW I need more technical and advanced information on office automation. Sign me up for your two-day ADVANCED session at $295 per person.

☐ My check is enclosed. ☐ Bill my company. ☐ Bill me.
Charge to: ☐ American Express ☐ Visa ☐ Master Card

Account # ____________ Expires ____________ Signature ____________
Name ____________ Title ____________
Company ____________
Address ____________
City ____________ State ____________ Zip ____________

MAIL TO: ISC '81, c/o CW Conference Management Group
375 Cochituate Rd., Box 880, Framingham, MA 01701
TO REGISTER BY PHONE, CALL: 1-800-225-4698, ext. 435.
In Massachusetts call
(617) 879-0700, ext. 435.
Louise Myerow, Registration Coordinator.
CW

Pregnant CRT Operators Win Work Boycott

By Lois Paul
CW Staff

TORONTO — Four pregnant employees at Bell of Canada here recently won the right to refuse work on CRT terminals without loss of pay.

The women, who took part in a work boycott at the end of March, cited a Canadian law that allows workers who believe their health and safety are in jeopardy to refuse to do a particular job.

"The source of their refusal was fear of radiation with relation to birth defects and the stress of not knowing for sure that the equipment caused any kind of hazards to reproduction," according to Gary Cwitco of the Communications Workers of Canada.

The government was called in to investigate, but the Communications Workers union felt the radiation test would not give a definitive answer.

"It was our sense that the machines would be tested and the radiation levels would indicate low or no levels of radiation, as the National Institute for Occupational Safety and Health test showed in San Francisco, or tests in the United Kingdom, or anywhere else," Cwitco said.

A source of major concern was a case in August 1980 at the *Toronto Star* where four of seven children born to women working on CRTs in the same office during the same period of time had birth defects.

Cwitco said that although the issue of radiation has been rejected by science as a positive factor in that case, there has been no substantial information explaining how that kind of cluster could have occurred.

"Chances of that occurring by coincidence are very low, given the national average of three out of 100 births and the fact that this involved four out of seven births," he stated.

The union wrote to Bell of Canada, indicating that in the absence of specific information to the contrary, it would be better to err on the side of safety and allow these women to do other jobs.

The employer agreed and, after a day of negotiation, said the women could ask for and receive other work or take early maternity leave, in addition to their general leave, without losing their jobs.

This interim agreement is effective until the end of May. Until then, the union and the company are looking at other parts of the agreement, regarding items such as seniority rights, in terms of looking into a more long-term agreement.

DEC® VAX™ 11/780
COMPUTING SERVICES

- FPS ARRAY PROCESSOR
- FORTRAN, BASIC, MACRO, C
- APPLICATIONS DEVELOPMENT TOOLS

NOW AVAILABLE ON TYMNET®
LOCAL TELEPHONE ACCESS ACROSS THE U.S.

SIGNAL TECHNOLOGY, INC.
15 WEST DE LA GUERRA STREET
SANTA BARBARA, CA 93101

FOR FREE BROCHURE CALL 800 235-5787 | IN CALIFORNIA CALL 805 963-1552

® DEC [illegible]
™ VAX [illegible]
® TYMNET [illegible]

Local Network Architecture Seminar

To Think That It Could Have Been Me

if only I had taken the initiative

I remember last year when my colleague at another company took the Local Network Architecture seminar. Sure, I had gotten the brochure in the mail. In fact, we had even discussed attending together, but I couldn't be bothered. *Today, he got his promotion.*

I remember telling him that my division did not need local networking, that we were as efficient as possible. He said he knew how successful I had been but technology was always evolving new strategies. *Today, his productivity level is greater than mine.*

I remember his telling me that local network architecture strategies would enable DP users to link many different products of varying capabilities to their future operations. Also, he said that when commercially available local network interconnect systems couple together, the advantages of distributed processing systems can be realized. *Today, he utilizes resource sharing, availability, and piecemeal updating.*

I remember his detailing the difference between baseband and broadband. In addition, he received information regarding the bus protocols. Ethernet (CSMA/CD), token ring, and others. *Today, he has incorporated cost-effective bus structure interconnection strategy into his system.*

I remember his glowing reports about this three-day seminar. He said he gained the knowledge required to model, analyze, design, and develop a local computer network architecture. He added that his questions were answered through case studies which included HYPERchannel, HYPERcache, Ethernet, and studies of how IBM, CDC, and DEC equipments can be interconnected. *Today, he has applied this knowledge to the benefit of his company.*

I remember his saying that any programmer, designer, analyst, end-user, manager or telecommunication specialist with a superficial knowledge of the general properties of DEC and IBM equipment should attend. I didn't take the initiative. *Today, I wish I had.*

TECHNOLOGY TRANSFER INSTITUTE
P.O. BOX 49765, LOS ANGELES, CA 90049 (213) 394-8305

I remember his telling me that Dr. Kenneth Thurber is the leading contributor in the fields of bus structures and distributed processor interconnections. Also, he said that Dr. Thurber is a senior staff scientist with Sperry Univac's Defense Systems Division and a computer science faculty member of the University of Minnesota, and that he has published more than 60 papers. *Today, I wish I had heard Dr. Thurber.*

Yesterday, I got the newest brochures and information from Technology Transfer Institute. Again, they are sponsoring a Local Network Architecture seminar. I remember my colleague's eagerness to attend and the goals he achieved. For these reasons and many more, *TODAY, I took the initiative and I registered for the Local Network Architecture Seminar.*

June 1–3, 1981 Washington, DC

Call or write Technology Transfer Institute today for full seminar details:
(213) 394-8305

Please send me more information about the Local Networks Seminar.

Name
Company
Address
City State Zip
Telephone CW 4/20

Net Up at IBM, CDC, NCR Honeywell; Burroughs' Dips

IBM reported a 12.4% increase in revenues and a 7.1% increase in earnings for its first quarter of fiscal 1981.

Net earnings for the period totaled $730 million or $1.25 per share, up from $681 million or $1.17 per share in the corresponding period last year.

Revenues climbed to $6.5 billion, up from $5.7 billion in the prior year's first period. Revenue from sales totaled $2.47 billion, up 15.8%; rental revenue was $2.7 billion, up 4%; and revenue from services reached $1.2 billion, up a whopping 27.9%.

During the period, IBM had an exchange gain of $27 million compared with losses of $30 million in the corresponding period last year.

Some analysts were modestly disappointed with IBM's first-quarter results. Tom Crotty of the Gartner Group had predicted earnings in the $1.25 to $1.33 range, with a target of $1.33.

In general, revenues seemed to be on target, but earnings continue to be squeezed in the industry, Crotty added. Margins will remain flat for the rest of the year, he predicted. Margin pressure is being exerted by the strength of the dollar in foreign markets and by heavy research and development expenditures, primarily for semiconductor research, Crotty maintained.

At Control Data Corp. computer revenues advanced 15.1% while earnings from that segment of the firm's business grew 31.7%.

Overall, CDC's revenues totaled $972 million, up 10% from revenues of $884 million in the first quarter last year. Computer revenue totaled $720 million, up 15.1% from $625 million.

Earnings from computers totaled $27 million, while earnings from commercial credit dropped 9.5% to $13.3 million from $14.7 million.

Corporatewide earnings were $40.3 million or $2.12 per share, up from $35.2 million or $2.03 per share in last year's first quarter.

Burroughs Corp. reported a 12% increase in revenues, while earnings decreased 53% from last year's first-quarter results.

At the company's annual meeting last month, Burroughs Chairman W. Michael Blumenthal told shareholders that earnings comparisons for the first half of 1981 would be unfavorable when compared with the like period of 1980, but that the second half of the year should show positive growth.

Revenues were $756.5 million, up from $673.6 in the same quarter a year ago. Outright sales revenue increased 12% and rental revenue rose 7%, while service revenue advanced 15%.

Earnings were $22.3 million or 54 cents per share, compared with earnings of $47.6 million, or $1.16 per share, in 1980's first quarter.

Blumenthal said incoming orders were essentially at the same level as last year's first quarter.

At Honeywell, Inc., pretax earnings dropped from $110.7 million in 1980's first quarter to $90.7 million. With adjustments, however, the firm's net earnings rose 16.5% to $52.3 million, or $2.31 per share, from $44.9 million, or $2.20 per share.

Edson Spencer, the company's chairman and chief executive officer, said pretax profits declined in both the computer and control systems businesses, but higher net income resulted from a smaller loss in the equity income of associated companies and a lower effective tax rate than was the case last year.

Revenues for the first quarter totaled $1.2 billion, up from $1.13 billion last year. Revenue from computer rental and service advanced to $212.7 million, up from $188.8 million in the same quarter of 1980.

Spencer said computer orders were down significantly in the U.S. from last year's level for both large and small systems. He blamed economic uncertainty and high interest rates for the reduced order rate.

NCR Corp.'s earnings increased 8.2% to $27.6 million or $1.02 per share from $25.5 million or 96 cents per share in the like quarter a year ago.

Revenues advanced 11.5% to $733.3 million from $657.5 million.

Access Sometimes Limited

Local Policymakers Seen Using Data as Weapon

By Brad Schultz
CW Staff

IRVINE, Calif. — Government managers value data they can use to evaluate and defend policies, the Urban Information Systems (Urbis) Research Group found, but managers sometimes limit access to computerized data banks lest rivals use the resources against them in "data wars."

While policymakers traditionally believe data reduces uncertainty about what they do, automated information systems can raise uncertainty, Urbis noted, as different parties in government control accumulation and manipulation of data banks.

Computerization has therefore led many policymakers to use raw data less extensively in the process of forming policy, Urbis concluded in its forthcoming book, *Computers and Politics*. Yet governments have acquired computer systems to provide more data for decision making because managers believed this would lead to "more rational" policies, the Public Policy Research Organization (PPRO) scientists observed after on-site investigations of 42 U.S. cities.

Those who run local governments have learned that "data wars can be embarrassing because they often result in an ambiguous truce in which no one's original position seems tenable and no one's credibility seems enhanced," Urbis explained.

Administrators tend to use less what they control less, the researchers pointed out, and decreased use of data in policy formation shows their adjustment to an important consequence of automation in cities: Systems move control over who handles data to DP technical experts, commonly organized in a separate department.

These are the fourth and fifth articles in a seven-part series on how computing affects local government. The series is based on soon-to-be-published research conducted by the Public Policy Research Organization's Urban Information Systems Research Group.

The DP department may not choose sides in a data war, Urbis indicated, but its status can be analogous to that of a weapons merchant in a war zone, ready for business with either side and therefore a potential threat to both sides.

After a while, this makes data warriors — what Urbis termed an "information elite" that includes planners, analysts and managers — leery of DPers and less interested in using computer systems to advance particular policies.

Local government policymakers lose control over manipulation of data to other parties in two ways, the PPRO book stated. First, "the automated system typically contains a full data set as well as the necessary information about the meanings of the data elements."

Second, whoever in the local government can access the automated system and control the DP specialists that support it can "undertake an extraordinary range of record-restructuring and sophisticated analytic activities." In the days when an agency kept data only in manual files, that agency dominated such manipulation of those files. The agency monopolized the information and insight necessary to "decode" the data base, Urbis noted.

Computers make data formerly controlled by a specific agency available to several agencies, even other levels of government. Computerized data flows faster as well — a worrisome

(Continued on Page 16)

DPers Care More About Systems Than Solving User Problems, Study Finds

By Brad Schultz
CW Staff

IRVINE, Calif. — In many city agencies, planners and managers complain that DPers are more interested in souping up systems than solving user department problems, the Urban Information Systems (Urbis) Research Group found.

The Public Policy Research Organization (PPRO) scientists asked those who set and execute policy in local governments what DP professionals do to help out. Of those having direct contact with DPers, 37% said the latter have muddled conversations with technical jargon; 36% charged the computer staff cared more about computer capabilities than solving user problems; and 37% said DPers would rather work on new applications than improve existing ones.

"While less than a majority of the users agree with all of these observations," Urbis noted in the forthcoming *Computers and Politics*, "a majority (53%) do agree with one or another of them." After on-site investigations of DP at 42 U.S. cities, Urbis concluded that relations between the two elites computing has created in government — the "information elite" and the "computer elite" — have typically grown quite strained.

Planners, analysts and managers comprise the local government's information elite, which depends on the computer elite — the DP technical experts — to advance policies. The latter rarely cares about the nature of policies or what policies do, but intimidates many of the information elite by controlling who can access and manipulate computer-stored data [CW, April 13].

'Data Wars'

Sometimes a city's DP department is caught between opposing factions of the information elite that yield computer-stored data as weapons in what Urbis has termed "data wars." While the factions slug it out, DPers often control the flow of data, the way data is structured in computer memories and procedures for entering more data.

However, the information elite does work with the computer elite in designing applications, Urbis observed. And top administrators among the elite, such as the mayor or city manager, routinely sign off on major DP equipment acquisitions and changes to the computer staff's size or salary structure.

Urbis estimated that 40% of users in the 42 cities under study have served in groups designing computer applications. Excluding detectives and police, who formed a large portion of the user population, this figure rises to 60%, the PPRO team reckoned. Thus, neither elite fully dominates the other, while members of either elite regularly apply what clout they have to their advantage.

"The computer elite do sometimes parlay their centrality to the functional activity and their technical knowledge and skills into a position of prevalence over the users of their services," Urbis maintained. DP professionals sometimes infuse projects and applications with more technical jargon and complexity than necessary, just to make users feel incompetent, the researchers noted.

As data warriors clobber each other with turgid computerized analyses intended to justify various policy positions, the local government's DP manager gains "a quite comprehensive view" of what policymakers can do to the "computer package" (Urbis'

(Continued on Page 16)

About the Study

Articles in this series on local government computing summarize portions of Computers and Politics, *a book by James N. Danziger, William H. Dutton, Rob Kling and Kenneth L. Kraemer to be published by Columbia University Press, 526 W. 113 St., New York, N.Y. 10025.*

Computers and Politics *is the second book from the Public Policy Research Organization's (PPRO) Urban Information Systems (Urbis) Research Group based on the Urbis study of DP at 42 U.S. cities. The first book,* The Management of Information Systems *by Kraemer, Dutton and Alana Northrop, was published by Columbia University Press this year.*

PPRO is an institute of the University of California at Irvine. For more information on Urbis projects, contact Kraemer c/o PPRO, University of California, Irvine, Calif. 92717.

When computers are all over your organization,

CAN YOU MAINTAIN MANAGEMENT CONTROL IN A DISTRIBUTED COMPUTING ENVIRONMENT?

Send for full seminar information!

A 3-DAY SEMINAR

Distributed Systems Can Meet Legitimate User Needs While Avoiding the Penalty of Duplication

Most MIS managers view distributed systems with decidely mixed emotions. They are concerned that low hardware costs can be highly deceptive to the naive user, and can lead to a proliferation of local processors that can't exchange data.

Users, on the other hand, often feel that their information needs are not being met by conventional centralized systems. They see distributed systems as a way to escape from the constraints of the existing system and organization structure.

This seminar will give you a comprehensive view of distributed systems. Case studies will describe the pros and cons, the benefits and pitfalls. Learn the strategies involved — distributed systems are successful only when carefully planned within a well thought out strategy that is consistent with the objectives of the organization.

Call or write Technology Transfer Institute today
for full seminar details
(213) 394-8305

TECHNOLOGY
TRANSFER
INSTITUTE
PO BOX 49765 LOS ANGELES CA 90049 213 394 8305

JAMES C. EMERY
STEPHEN HEFFNER

James Emery is a leading authority on management information systems. He is currently Professor of Decision·Sciences at The Wharton School, University of Pennsylvania.

Stephen Heffner is a consultant in the areas of distributed processing design and implementation and data communication network design and implementation, and is President of Pennington Systems, Inc.

June 1–3, 1981 San Francisco

CW 4/20

Please send me
more information about

STRATEGIES FOR DISTRIBUTED COMPUTING

Name
Company
Address
City State Zip
Telephone

Policymakers Limit Access in 'Data Wars'

(Continued from Page 15)

situation in bureaucratic politics where individuals constantly try to monitor the location of information that could embarrass them.

Compounding Confusion

By releasing torrents of data to diverse parties within a local government, computers provide fuel that fires an increasing number of plausible alternative policies, confounding advocates of any single position, Urbis suggested.

As a case in point, the PPRO book recounts how a transportation department in "an urban Eastern county" presented a computer analysis to justify substantial expansion in the area's arterial road system.

"The planning department in the county's major city then countered with a reanalysis of the same data," Urbis stated, "making different assumptions about the changes in population movement and economic development, and concluded that no additional roads were necessary.

"Ultimately, the different assumptions were not resolvable and this data-based debate ended in a confused stalemate."

According to Urbis, local government managers are more inclined to use computer-stored data whose manipulation and application they can control. Agency chiefs are less inclined to use data whose manipulation and application others control.

Policymakers, Urbis continued, are less likely to predicate arguments for a policy position on computerized data that other parties could later make the basis of counterpositions or proposals that could weaken the former's influence.

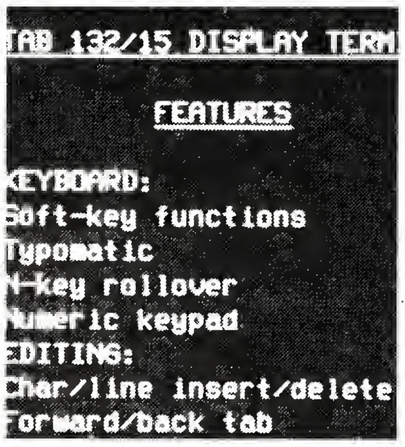
These conclusions by the PPRO investigative team oppose the "managerial rationalist perspective" most local government administrators have been trained to accept [CW, March 30].

Managerial rationalists, Urbis maintained, believe " 'politics' can be removed from policymaking by providing better data or improved technologies for accessing or manipulating data."

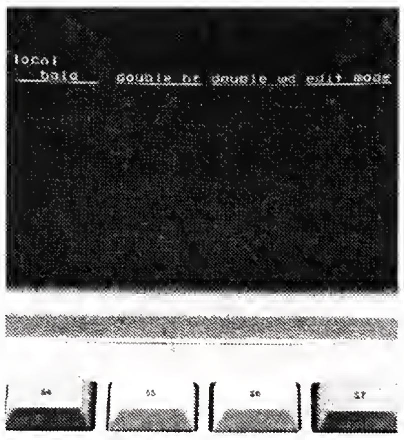
The forthcoming Urbis book, which will be published by Columbia University Press, asserts that "computerized information will tend to be used where the policymaker believes that he or she will suffer a competitive disadvantage by not using it."

Emphasizing the inherently partisan nature of government computing, the book notes that "the first casualties of a data war are likely to be those with few or no data resources."

Since citizens groups that strive to keep government accountable to the public commonly lack such resources, the PPRO researchers warned, government computing undermines democracy regardless of whether it makes government operations more efficient and cost-effective.



Non-glare, high resolution screen
(Unretouched photo)



Screen-labeled soft keys

Meet A Smart Performer

15" Screen, 132 Characters per Line, 7 x 11 Dot Matrix, Over 100 Operator Selectable Functions in 8 Soft Keys, 4 Page Memory.

(Unretouched screen)

Now, you can have all the features of the best terminals on the market in a single unit. All on a large screen with crisp, clear characters. The TAB 132/15. You'll get the kind of screen action you've been looking for.

Bidirectional smooth or jump scroll. Horizontal scroll. Split screen. 19,200 Baud communications. ANSI and DEC compatible. Full range of character attributes and editing features. English prompted set up mode. 24 data lines plus status and prompt lines. And more.

Solve your most demanding applications problems. Boost your operator productivity.

Screen test the TAB 132/15 today. You'll see a smart performance.

Distributor/OEM Inquiries Invited

See us at NCC booth No. 938

Think TAB for Terminals

TAB PRODUCTS CO

Call or write: Smart Performer, TAB Products Co., 1451 California Avenue, Palo Alto, California 94304, 415-858-2500.

User Problems Seen Neglected

(Continued from Page 15)

term for the computing equipment, personnel and attendant procedures for which the DP manager is responsible).

According to the authors of *Computers and Politics,* "major regulators" of local governments — chief executive officials and the legislature — influence the computer package by making general decisions about resource allocation or administrative organization, whereas elected city council members rarely influence the package at all.

This was what Urbis learned from a survey of DP managers, who also indicated that other local government administrators — such as accounting officials — have focused attention on major equipment acquisitions, rather than on whether existing equipment was cost-effective, reliable and secure.

Intergovernmental boards, typically composed of regulators from several cities that share computing resources, seldom had much influence over the computer package, the DP managers told Urbis. However, this apparent indifference might reflect general satisfaction among the boards that computer systems have worked out well. Such regulators seldom try to influence computer packages unless major failures or malfeasance become obvious, Urbis pointed out.

These findings conflict with "managerial rationalism," the perspective on computing's organizational dynamics that most public administrators are trained to accept, Urbis asserted. According to managerial rationalism, top managers with organizationwide concerns directly dominate decisions about computing, which acts to make management policies more "rational" [CW, March 30].

The PPRO scientists charge that top managers seldom have direct influence on the computer package and are commonly intimidated by the computer elite. The resources supported by this elite — which generally finds the technology more interesting than the application — figure as weapons of war, Urbis suggested, when policymakers quarrel among themselves on what government ought to do.

IBM 370X-Type Machines Fill Key Net Roles

Product Spotlight

A round-up of IBM-compatible communications processors appears in the charts on Pages 18 and 19.

(Continued from Page 1)

er communications processor brands — not plug-compatible — did that well or better.

Communications processors now occupy a critical place in the contemporary data network user's arsenal of hardware. These machines assume burdens of protocol conversion, network management, performance monitoring and security protection that hitherto fell on host mainframes.

As the charts on Pages 18 and 19 suggest, a communications processor may serve as a front-end processor for several hosts; as a remote concentrator, consolidating data flows among clusters of perhiperals; as a free-standing machine with its own data base system; and as a store-and-forward message switching system. A number of communications processors fill all these roles and more.

Major Models

The charts, based on information in Datapro's latest "All About Communications Processors" report, list most of the major models offered in the U.S. as plug-compatible with IBM's 3704s and 3705s. The $15 Datapro report, which also includes the user survey, lists many other communications processors not IBM-compatible. It can be ordered from the research company at.1805 Underwood Blvd., Delran, N.J. 08075.

As journalist and consultant Ronald A. Frank noted at a recent conference, IBM's 3705 is an old processor family, originated in the late 1960s when data communications had scarcely begun in commercial DP environments. Many data communications experts consider the 3705 "upgraded to death," Frank maintained.

Although some experts seemed convinced last year that IBM would announce a replacement family in first quarter 1981, the giant vendor unveiled three more 3705s — the M81, M82 and M83 — just before April Fool's Day [CW, March 30]. IBM representatives have told some customers to expect a replacement family, informed sources have told *Computerworld*, but the recent additions indicate that IBM will continue shipping 3705s for some time to come.

According to Frank, the 3705 is "retarding progress" in IBM's Systems Network Architecture (SNA). To date, SNA has dampened the user's ability to decentralize DP functions in a network, pressuring the user to run a massive tangle of systems-level communications software through machines at central headquarters.

As the 3705 has evolved from a "relatively slow bit-interrupt machine," Frank said, it has come to contain much of this critical software. This growth in functions has led IBM to take the 3705 through a number of upgrade cycles, sorely taxing the basic 3705 design IBM drafted when Lyndon Johnson was President.

In its early years, the 3705 had a 64K-byte main memory, considered sufficient for execution of what was then IBM's Network Control Program, Frank continued. Later, IBM had to give the 3705 240K bytes of memory and new logic so the communications processor could handle new software.

Many IBM customers now need half a megabyte of memory in the 3705, Frank asserted, because IBM's ACF software alone occupies some 225K bytes in execution.

For the future, IBM wants more functional complexity built into the firmware of its communications processors, Frank declared. This partly reflects rising maintenance costs, which could be mitigated by endowing the processors with circuit boards easily replaced when troubles arise.

IBM is due to move fiercely against the plug-compatible alternatives presented in the charts accompanying this article, several industry watchers have told CW. According to Frank, IBM has a "reaction rule": when competitors take away 10% of potential sales, the vendor's marketing strategists then know "it's time to move."

Vendor Addresses

Addresses are given below for the seven companies that manufacture the 16 IBM-compatible communications processors listed in the charts.

Amdahl Corp.: 1250 E. Arques Ave., Sunnyvale, Calif. 94086.

Codex Corp.: 20 Cabot Blvd., Mansfield, Mass. 02048.

Computer Communications, Inc.: 2610 Columbia St., Torrance, Calif. 90503.

DPF, Inc.: 141 Central Park Ave. S., Hartsdale, N.Y. 10530.

IBM (Data Processing Division): 1133 Westchester Ave., White Plains, N.Y. 10604.

Memorex Corp. (Communications Group): 18922 Forge Drive, Cupertino, Calif. 95014.

NCR Comten, Inc.: 2700 Snelling Ave. N., St. Paul, Minn. 55113.

HOW TO MAKE SURE YOU NEVER BECOME OBSOLETE

A fast, furious, five-day course for Software managers, to update you well into the 80's. Taught personally by Ed Yourdon and Tom DeMarco.

You're a seasoned, top-flight Software manager, but the world you manage has changed dramatically.

The techniques are new. The people are new. They develop systems differently than you once did.

You haven't the time to go back to school to catch up. And those expensive methodologies leave you gasping to know more.

How can you update yourself completely, in the shortest possible time?

SPEND FIVE DAYS
WITH YOURDON AND DEMARCO
IN NEW YORK CITY, JUNE 8 to 12

Ed Yourdon and Tom DeMarco are leading authorities on managing structured techniques. In their complete five-day course, "Strategies for Software Development," they will arm you with facts and principles that will carry you well into the 80's. They will teach you how to separate superficial change from significant change.

You'll return to your shop better able to understand the new techniques you must manage. You'll know where your projects stand and where they're going. And you'll have firmer control of any new changes that hit you.

After you finish your course, the 150-person Yourdon organization and Yourdon Press will be there to *keep* you updated, year in and year out.

Send the coupon at right or phone Yourdon toll free to sign up.

☐ Sign me up for "Strategies for Software Development" in New York City, June 8 to 12.
☐ Send me detailed brochure of the course.

Name

Organization Title

Address

City State Zip

Telephone

YOURDON
1133 Ave. of the Americas, New York, NY 10036
Phone (212) 730-2670

Call us toll-free at 800-223-2452
(In Canada and New York State, 212-730-2670 Collect)

Sampling of IBM 370X-Type

Product Spotlight

Characteristics	Amdahl 4705	CCI CC-80	CCI CC-80RC	CCI CC-85	CCI CC-85AC	CCI CC-8000	Codex 6520	DPF CMC4
Mainframes Interfaced	Amdahl, 470, 580 and Compatibles	IBM 360, 370 30 Series, 4300, Itel Amdahl and Compatibles	IBM 360, 370, 30 Series, 4300, Itel, Amdahl and Compatibles	IBM 360, 370, 30 Series, 4300, Itel, Amdahl and Compatibles	IBM 360, 370, 30 Series, 4300, Itel, Amdahl and Compatibles	IBM 360, 370, 30 Series, 4300, Itel, Amdahl and Compatibles	IBM 360, 370, 4300, 30 Series and Compatible Mainframes	IBM 360, 370, 30 Series, 4300, Amdahl, Magnuson, CDC, Omega and others
Front End?	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Maximum No. of Hosts Supported Simultaneously	4	7	—	7	—	7	4	1
Maximum No. of Hosts Channel-Attachable	4	7	—	7	—	7	4	1
Maximum No. of Stations Pollable per Line, System	Depends on Software	Unlimited	—	Unlimited	—	Unlimited	Depends on Device	4,096
Remote Concentrator?	Yes	No	Yes	No	Yes	Yes	No	No
Maximum No. of Remote Connections to One Host	1	—	32	—	32	32	—	—
Maximum No. of Hosts Served by One Concentrator	1	—	32	—	32	32	—	—
Maximum No. of Stations Pollable on One Line	Depends on Device	—	Unlimited	—	Unlimited	Unlimited	—	—
Free-Standing Communications Processor?	No	Yes	No	Yes	No	Yes	No	RPQ
Network Architecture Supported	—	CCI, NCS	—	CCI, NCS	—	CCI, NCS	—	—
Full-Capacity DBS	—	No	—	No	—	No	—	—
Operating System	—	CCI, NCS	—	CCI, NCS	—	CCI, NCS	—	—
Store-and-Forward Message Switch?	No	No	No	No	No	Yes	No	RPQ
Half-Duplex Line Capacity to 1,800 bit/sec	352	1,232	240	1,232	240	240	240	4
Half-Duplex Line Capacity 2,000- to 9,600 bit/sec	352	1,232	240	1,232	240	240	240	4
Half-Duplex Line Capacity Faster than 9,600 bit/sec	45 plus	1,232	240	1,232	240	240	Varies	3
Fastest Line Speed Supported (bit/sec)	56K	230.4K	230.4K	230.4K	230.4K	50K	230.4K	56K
Main Memory Storage Capacity (bytes)	512K	512K	512K	512K	512K	512K	64K	64K
Purchase Price	$50,000 to $350,000	$98,750 plus	$98,750 plus	$128,750	$134,750 plus	$148,750 plus	$41,000 plus	$13,500 to $19,500

CW Chart

Communications Processors

Product Spotlight

Characteristics	DPF CMC8	DPF CMC32	IBM 3704	IBM 3705-II	IBM 3705 M80-Series	Memorex 1380	NCR Comten 3650	NCR Comten 3690
Mainframes Interfaced	IBM 360, 370, 30 Series, 4300, AS, Amdahl, Magnuson, CDC, Omega and Others	IBM 360, 370, 30 Series, 4300, AS, Amdahl, Magnuson CDC, Omega and Others	IBM 360, 370, 30 Series, 4300	IBM 360, 370, 30 Series, 4300	IBM 370, 30 Series, 4300 and many 360 Under 270X Emulation	IBM 360, 370, 30 Series, 4300 and Compatibles	IBM 360, 370, 30 Series, 4300, CDC, Omega, Amdahl, Custom	IBM 360, 370, 30 Series, 4300, CDC, Omega, Amdahl and Custom
Front End?	Yes	Yes	Yes[1]	Yes[1]	Yes[1]	Yes	Yes	Yes
Maximum No. of Hosts Supported Simultaneously	1	1	1	4	2	4	2	8
Maximum No. of Hosts Channel-Attachable	1	2	1	4	2	8 (4 at a time)	2	8
Maximum No. of Stations Pollable per Line, System	4,096	4,096	Depends on Device	Depends on Device	255 (Line), 4,080 (System)	Unlimited	4,096/ processor	16,384/ processor
Remote Concentrator?	No	No	Yes	Yes	Yes[2]	RPQ	Yes	Yes
Maximum No. of Remote Connections to One Host	—	—	1	1	253	Contact Vendor	15	15
Maximum No. of Hosts Served by One Concentrator	—	—	1	1	8	Contact Vendor	Unlimited	Unlimited
Maximum No. of Stations Pollable on One Line	—	—	Depends on Device	Depends on Device	255	Contact Vendor	32	32
Free-Standing Communications Processor?	RPQ	RPQ	No	No	No	No	Yes	Yes
Network Architecture Supported	—	—	—	—	No	—	SNA, CNA	SNA, CNA
Full-Capacity DBS	—	—	—	—	—	—	—	—
Operating System	—	—	—	—	—	—	IBM's EP, NCP, NCS, DSS, ACF/NCP	IBM's EP, NCP, CNS, DSS, CTAM, ACF/NCP
Store-and-Forward Message Switch?	RPQ	RPQ	No	No	No	No	No	Yes
Half-Duplex Line Capacity to 1,800 bit/sec	8	32	32	352	16	112 to 216	128	512
Half-Duplex Line Capacity 2,000 to 9,600 bit/sec	8	32	32	352	16	64	128	512
Half-Duplex Line Capacity Faster Than 9,600 bit/sec	6	24	32	32	8	40	32 to 128	128 to 512
Fastest Line Speed Supported (bit/sec)	56K	56K	134.5K	230.4K	57.6K (with optional direct interface)	230.4K	230.4K	230.4K
Main Memory Storage Capacity (bytes)	64K	64K	64K	512K	256,000 char.	64K	512K	4,096K
Purchase Price	$20,000 to $35,000	$34,770 to $65,645	$22,100 to $24,455	$38,230 to $122,040	4-line 3705-M81, $38,940; 16-line 3705-M83, $155,940[3]	Contact Vendor (Varies)	$45,000 to $125,000	$130,000 to $550,000

CW Chart

1. But officially "No." IBM calls the 3704 and 3705 communications controllers.
2. With Network program load.
3. Both versions include channel adapter.

ACS Trains Retirees to Fill Programming Slots

By Lois Paul
CW Staff

BRADENTON, Fla. — The 33 people who graduated here last week trained as Cobol programmers on Prime Computer, Inc. equipment will not be striking out to find their first jobs. Most of them have been retired for a number of years.

And unlike many other graduates who cannot find immediate employment, these 33 began work the day after graduation. They started at ACS America of New York, whose subsidiary Wave III organized and taught the free course to train retired persons as programmers.

"I could staff half the boards of the Fortune 500 companies with the people taking this course," Eric Knudson, chairman of ACS America, said. He added that the graduates include former vice presidents of oil companies, a retired admiral and an ex-IBM vice president.

If the graduates want, ACS will supply them, at its cost, with Radio Shack TRS 80 Model 3 microcomputers to use in their homes. They can transmit their completed code to the computer center that has been set up in Florida for a fee of less than $100/mo, or they can work within the computer center for free, according to Knudson.

Eventually, the company expects that a third of the new programmers will work on proprietary software for ACS and the other two-thirds will do contract programming for ACS' customers.

The idea for the retirees' course originated from experiences within ACS itself, which was dealing with part-time non-DP professionals during its work on Prime Computer, Inc.'s Office Automation System.

Knudson said the company also lost about six top technical people once this project was completed. "There was at least a $3,000 to $4,000 premium on them," Knudson added. This experience, coupled with the growing recognition of the imbalance of the DP marketplace and the constant need for qualified programmers, motivated ACS to look toward another potential core of programmers.

Why look to retired people? 'The country itself is aging very rapidly and it cannot afford to have a majority of its adults retired,' Knudson answered.

Why look to retired people rather than college graduates or teachers looking for new careers? "The country itself is aging very rapidly and it cannot afford to have a majority of its adults retired," Knudson answered.

He added that retired people have a different set of values and a strong work ethic. "They are more ambitious and loyal than our generation," he said.

Deluge of Responses

The first training class began in January here on the west coast of Florida. Although there was no initial advertising aside from one newspaper article last September, ACS was deluged with 3,000 applications for 36 openings.

Knudson said people were writing in from other states, saying, "Please give me the aptitude test. If I pass, I'll move." Between 6,000 and 10,000 applications have been received to date. Wave III had to add a full-time person just to handle correspondence.

"The program itself has been absolutely spectacular," he said. Thirty-six people began the course and the anticipation was that 20 would complete it. "The fallout has been virtually nothing," Knudson said, noting that 33 of the original 36 students graduated from the course. One person who dropped out has formally requested to be in the second class.

Sessions were held between 9 a.m. and noon daily, but fully 80% of the class remained in the computer center from 8:30 a.m. to 5 p.m. each day, Knudson said. "We literally had to throw them out at 6."

The students learned Cobol programming on Prime computers, not DP. Students graduated on April 13 and on April 14 began working for ACS in Florida.

"They all will stay with us," Knudson explained, adding that he anticipates having about 1,000 of these workers within the next three to four years.

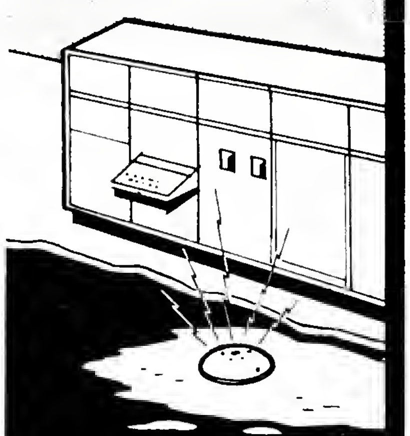
The company will pay its new employees $90 a day, based on an estimate of how long it would take an average experienced Cobol programmer to complete a program. That is, if the estimate is four days, the workers will be paid $360, whether they complete the program in two days or ten days.

They are restricted to four times the estimated amount of time to complete the program before it is turned over to someone else and they will not be paid.

The intelligent terminals being used by the students at the computer center in Florida are Ontel Corp. 32K microprocessors. ACS's host equipment consists of Prime 750 mainframes with 1.5M bytes memory each and 600M bytes of disk storage. There is a 9,600 bit/sec leased line connecting the CPU in Florida to the CPU in New York. Program specifications are written in New York with programming by the new workers occurring in Florida. ACS uses Tymshare, Inc.'s packet-switching network to link the two centers.

The next class will begin in June and another is scheduled for December. Both will be limited to 35 people. According to Knudson, ACS plans to expand the program to other areas, including Fort Myers, Fla. in the first quarter of 1982; Clearwater, Fla.; and Phoenix.

Each new unit will be based on a new machine, he said, noting that the next class will be learning Cobol programming on IBM equipment. Future companies include Digital Equipment Corp. and Tandem Computers, Inc.



AVOID DOWNTIME!
WATER ALERT®
. . . FOR COMPUTER AREAS

Warns you of water leakage in sub-floor wiring areas.

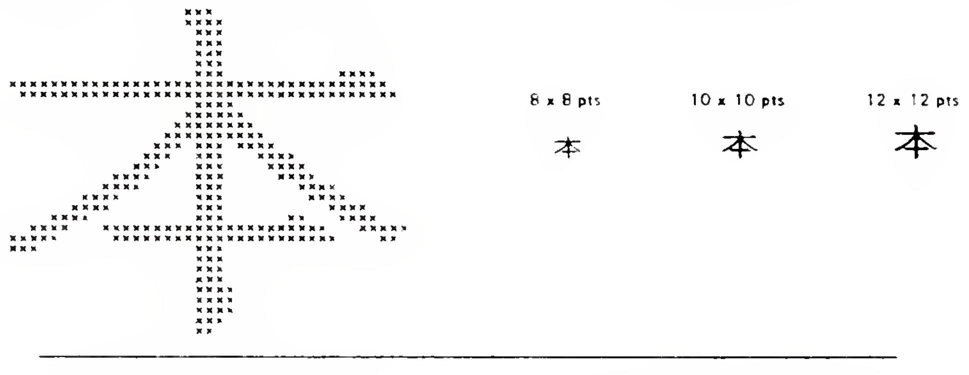
- Produces a loud, intermittent alarm when activated by presence of water.
- Completely self-contained . . . no wiring, no connections.
- Early water detection (1/64" water film activates alarm) provides maximum time for corrective action.
- 24 hour per day monitoring.
- Options include remote indicator, remote flashing light, and automatic telephone dialer.

8 Models from $59 - $110
Call or write for complete information.

Dorlen Products
Division of Electro-Consultants, Inc.
7424 W. Layton Ave., Milwaukee, WI 53220
Phone 414-282-4840

USERS OF RASTER PRINTERS
XEROX 9700® – BURROUGHS B9270
BUILD SYMBOLS, LOGOS AND
SCALE – REDESIGN – ROTATE
YOUR EXISTING FONTS

Type on Your Text Editor : and print :



Original Serif 11 x 11 pts
MEDIAMATICS INC.
Reduced to 8 x 10 pts.
MEDIAMATICS INC.
Expanded to 14 x 14 pts
MEDIAMATICS INC.
Expanded to 14 x 14 pts negative
MEDIAMATICS INC.
Expanded to 16 x 16 pts italic (33%).
MEDIAMATICS INC.

Original Sans Serif 10 x 10 pts.
MEDIAMATICS INC.
Reduced to 10 x 8 pts.
MEDIAMATICS INC.
Expanded to 14 x 14 pts.
MEDIAMATICS INC.
Expanded to 14 x 14 pts negative
MEDIAMATICS INC.
Expanded to 16 x 16 pts italic (33%).
MEDIAMATICS INC.

Call (301) 652-6590
or write: Raymond Wishner
Mediamatics Inc. Suite 334
5301 Westbard Circle
Bethesda, MD 20016

Our Logo:
MEDIA MATICS

This ad was formatted with Mediamatics General Purpose Publication System, printed on a Xerox 9700 as you see it
® is a registered trademark of Xerox Corporation

Asis Requests 1981 Nominations For Outstanding Science Teacher

WASHINGTON, D.C. — The American Society for Information Science (Asis) in conjunction with the Institute for Scientific Information (ISI) requests nominations for the 1981 Outstanding Information Science Teacher Award to be presented at the 1981 Asis annual meeting here on Oct. 26-30.

Nominees need not be Asis members, but must be engaged in teaching some aspect of information science on a continuing basis in an academic or nonacademic setting.

Nominations for the award, which consists of a $500 cash prize and a certificate, should be submitted to Outstanding Information Science Teacher Award Jury, Asis, 1010 16th St., N.W., Washington, D.C. 20036.

Asis is also sponsoring a 1981 Student Paper Contest. Any student in a degree-granting program can submit a paper, though doctoral theses are not acceptable. A paper must fall into the scope of the journal of Asis and must be endorsed by a faculty sponsor. The winner will receive round-trip travel expenses and full registration for the 1981 Asis annual meeting (not exceeding $500) and a Best Student Paper certificate.

Deadline for submission of papers is June 15. A copy of the contest rules is available from Skip McAfee, Asis, 1010 16th St., N.W., Washington, D.C. 20036.

Among Users and Manufacturers

Demand for Technical Managers Found Rising

By Bruce Hoard
CW Staff

NEW YORK — The demand for technical managers in both user companies and computer manufacturing firms will increase significantly from 1980 to 1981, according to data compiled by R.W. Consultants, Inc.

The executive search firm based its results on information obtained from 100 companies that produce and/or market information processing equipment.

"This year's Department of Commerce forecast indicates the computer industry will show a 26% gain in dollar volume in 1981," according to Robert H. Book, the company's president. "And the recruiting goals of the industry seem to almost parallel this anticipated growth at the moment."

According to Book, some of the positions currently most in demand include:

- Vice-president of information systems.
- Vice-president of office automation.
- MIS project manager.
- Data center manager.
- Office automation manager
- Manager of MIS.
- Systems and programming manager.

Salaries to Rise

Computer industry growth will create not only a shortage of qualified technical managers, but also could drive up salary scales, Book said. "As more people with scientific backgrounds are needed to fill middle-management roles in technology-based companies, these managers will find themselves being considered more as technical managers and less as technicians in managerial positions.

"This integration of science and management should help to lessen the traditional barrier that has existed between these disciplines," the firm's president said.

The company recently conducted a search for a software group supervisor for a large utility in the East. The person to be hired was to have been responsible for all technical, nonaccounting applications on a Digital Equipment Corp. DEC 20 minicomputer.

Scarcity of Talent

Research showed a scarcity of talent, the firm said. Actual salaries were approximately 20% above what the utility had planned to offer. After upping its salary offer, the utility secured a qualified candidate.

In another case, a division of a multibillion-dollar forest products company required an internal consultant in software development for multiple microprocessor-based units. Again, there was a paucity of available talent.

As a result, several candidates who were offered the position immediately received counter proposals from their present employers, Book observed.

Several other potential candidates who were not seeking employment said they had been contacted three or four times about similar positions in the previous year.

The person who finally accepted the job did so because he felt the division's product line had greater market potential than the mature market products he had been involved with.

In a third instance, a large conglomerate decided to decentralize its MIS function because it could not keep pace with the demands placed upon it. A new minicomputer-based system was to be installed and a new MIS director hired.

The position generated a high level of interest from potential candidates because the director would be responsible for building a department from the ground up and for interfacing with vendors to select the hardware and software.

The eventual hire had proven supervisory capabilities, MIS operations background in a manufacturing environment and experience working with vendors, the firm said.

Openings Expected

Specific needs will include managers of product engineering to supervise and develop new hardware that ties in the capabilities of both microcomputer and minicomputer technologies. In addition, manufacturing directors experienced in supervising operations for office-of-the-future systems involving DP, word processing and image processing are needed, he said.

Further openings are expected for electrical engineers who have marketing experience and can serve as directors of product planning groups, according to R.W. Consultants.

Experienced software supervisors for minicomputer systems will be in greater demand at companies currently making large investments in in-house information processing systems, the company also found.

R.W. Consultants, Inc. is located at 50 E. 42nd St., New York, N.Y. 10017.

The new VISUAL 200 terminal has the features of competitive terminals and will code-for-code emulate them as well. A flick of a switch on the rear panel programs the VISUAL 200 for compatibility with a Hazeltine 1500, ADDS 520, Lear Siegler ADM-3A or DEC VT-52. This allows you to standardize on the new, reliable VISUAL 200 for virtually all of your TTY compatible video terminal applications, with no change in the software you've written for the older, less powerful terminals. And you're not limited to mere emulation; you can outperform them at the same time by taking advantage of the additional features and human engineering of the VISUAL 200, such as:

■ Detachable Solid State Keyboard
■ Smooth Scroll
■ Tilt Screen (10° to 15°)
■ Large 7 x 9 Dot Matrix Characters
■ Others in the Feature Comparison Chart

For a pleasant surprise on prices, call or write us today.

FEATURE COMPARISON CHART

FEATURE	Visual 200	Hazeltine 1500	Hazeltine 1420	Lear Siegler ADM-3A	Digital VT-52	ADDS 520	ADDS Regent 20	ADDS Regent 40
24 x 80 Screen Format	STD	STD	STD	STD	STD	STD	STD	STD
7 x 9 Dot Matrix	STD	STD	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Background/Foreground	STD	STD	STD	**NO**	**NO**	**NO**	**NO**	STD
Insert/Delete Line	STD	STD	**NO**	**NO**	**NO**	**NO**	**NO**	STD
Insert/Delete Character	STD	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Clear End Line/Field/Page	STD	STD	**NO**	**NO**	STD	**NO**	**NO**	**NO**
Blink	STD	**NO**	STD	**NO**	**NO**	**NO**	**NO**	STD
Security Mode	STD	**NO**	STD	**NO**	**NO**	**NO**	**NO**	STD
Columnar and Field Tab	STD	**NO**	STD	**NO**	**NO**	**NO**	**NO**	STD
Line Drawing	STD	**NO**	**NO**	**NO**	STD	**NO**	**NO**	STD
Upper/Lower Case	STD	STD	STD	**OPT**	STD	**NO**	STD	STD
Numeric Pad	STD	STD	STD	**OPT**	STD	**NO**	**NO**	STD
Composite Video	STD	**NO**	**NO**	**NO**	**NO**	STD	**NO**	**NO**
Current Loop	STD	STD	**NO**	**OPT**	**OPT**	STD	STD	STD
Serial Copy Port	STD	STD	**OPT**	STD	**OPT**	**NO**	STD	STD
Hold Screen	STD	**NO**	**NO**	**NO**	STD	**NO**	**NO**	**NO**
Detachable Keyboard	STD	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Solid State Keyboard	STD	**NO**	**NO**	**NO**	**NO**	**NO**	STD	STD
Typamatic Keys	STD	STD	STD	**NO**	**NO**	**NO**	STD	STD
Cursor Addressing	STD	STD	STD	STD	STD	STD	STD	STD
Read Cursor Address	STD	STD	STD	**NO**	**NO**	**NO**	**NO**	STD
Cursor Control Keys	STD	**NO**	STD	**NO**	STD	**NO**	**NO**	STD
Secondary Channel	STD	**NO**	**NO**	STD	**NO**	STD	**NO**	**NO**
Self Test	STD	**NO**	STD	**NO**	**NO**	**NO**	**NO**	STD
Baud Rate to 19,200	STD	STD	**NO**	STD	**NO**	**NO**	**NO**	**NO**
Smooth Scroll	STD	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Microprocessor	STD	STD	STD	**NO**	STD	**NO**	STD	STD
Tilt Screen	STD	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Switchable Emulations	STD	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

The new VISUAL 200 obsoletes competitive terminals without obsoleting the software.

VISUAL See for yourself

Visual Technology Incorporated
540 Main Street, Tewksbury, MA 01876
Telephone (617) 851-5000, Telex 951-539

A $22 Million Boondoggle?

FAA Radar Backup No Improvement: Patco

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The Federal Aviation Administration's (FAA) new computerized air traffic control (ATC) radar backup system does not live up to its promises and is not worth the $22 million already spent on it, according to the Professional Air Traffic Controllers Organization (Patco).

The Direct Access Radar Channel (Darc) system, currently in operation at three test sites — Salt Lake City, Chicago and Washington, D.C. — is scheduled to go on-line at the remaining 17 Air Route Traffic Control Centers (ARTCC) by June.

Designed by Raytheon Corp., Darc is meant as a replacement for the current outdated broadband backup system, which controllers have long criticized for its difficult and hazardous transition process. That process calls for controllers to physically move their 400-pound radarscopes from a vertical to a horizontal position in the event of a computer failure, as well as reidentify each of their planes through voice communication with pilots.

Reidentification is necessary because of the loss of the computer-generated alphanumeric data blocks that indicate a plane's altitude, ground speed, flight name and number. Critics of the old system have said that the confusing and cumbersome transition period can cause a controller to momentarily lose track of his planes and thus increases the chance of a midair collision.

Although Darc gives controllers a "better presentation [on the radarscope], a clearer and crisper picture with more likelihood that all targets will be showing" than the broadband it replaces, it "still has the same transitional problems as broadband," according to Mike Simons, director of Air Safety for Patco.

In the event of an ATC computer failure, with both Darc and broadband, "first [the controller] has to decide how long the thing's going to be down, which of course he doesn't know, so he has to decide whether to go to the backup or not," Simons said.

"Then he yanks the scope down into the horizontal position, writes up a 'shrimp boat' for every target [a plastic identifier that he will then move across the screen as the blip moves] and reidentifies each plane," Simons noted.

Problematic Process

The FAA acknowledges that Darc's transition process "is a problem," but is quick to point out that reidentification can now be done without voice communication to every pilot that the controller is following, according to FAA spokesman Gerald Lavey.

Darc provides controllers with a limited data block containing a discrete code for each aircraft and an altitude readout for transponder-equipped aircraft. Although the actual call numbers of aircraft are not included in the display, controllers can get that information "quickly" by checking the flight progress strips listing both discrete codes and call numbers for all aircraft, according to the FAA.

Therefore, while controllers will still use the shrimp boats, Darc "eases the transition by virtually cutting out radio communication with the pilots, and that's a help," Lavey claimed.

Patco disagrees. "Darc does not give a full data block; the FAA said it would, but it doesn't," Simons claimed. "It gives much less information than the primary radar data processing (RDP). It gives a little more information than broadband and a slightly better picture than broadband, but not $22 million better."

Furthermore, controllers lose some autonomy and decision-making power in their jobs through the loss of a "punch-in/punch-out" capability that was available with the broadband system, Simons charged. "If your scope suddenly starts to ripple or you have some little problems with it and you want to go to the backup, you can't do it with Darc; you've got to go to your supervisor and he's got to throw some switches and it takes a while," Simons said.

"That's another weakness in the system," Lavey conceded. "Now the systems engineer at the front desk and the assistant [facility] chief decide [when to use the backup]. So in other words, when the controller loses the primary channel, for example, he or she cannot just punch in and get Darc, and in a sense it takes away some of that control that they would like to have. That's understandable."

While the problems with Darc will not go away immediately, or even as soon as controllers would like, the FAA has plans for an improved version of Darc to be operational by 1983, according to Lavey. At an estimated cost of $40 million to $50 million, the improved version will feature full data blocks and a punch-in/punch-out capability, he noted.

MANAGERS:
Your DP training is an investment!
Make it a profitable one with the help of Edutronics/McGraw-Hill

Money Spent on Data Processing training is an investment. The expected dividend, of course, is an increase in efficiency and real productivity. So why gamble with your money and your people? Invest in an organization with an international reputation, extensive resources and unlimited growth potential. Invest in Edutronics/McGraw-Hill. We can help make the most of your training investment today as well as tomorrow. Whether it's training in subject areas such as VSE, Structured Program Design, PL/1, VS/1, VSAM or JES3, we've got what you need in a library of video-tapes designed to be used on your job site. For more information on making the most of your DP training investment, write or call us toll free at 1-800-255-6324. We'll turn your investment into a profit.

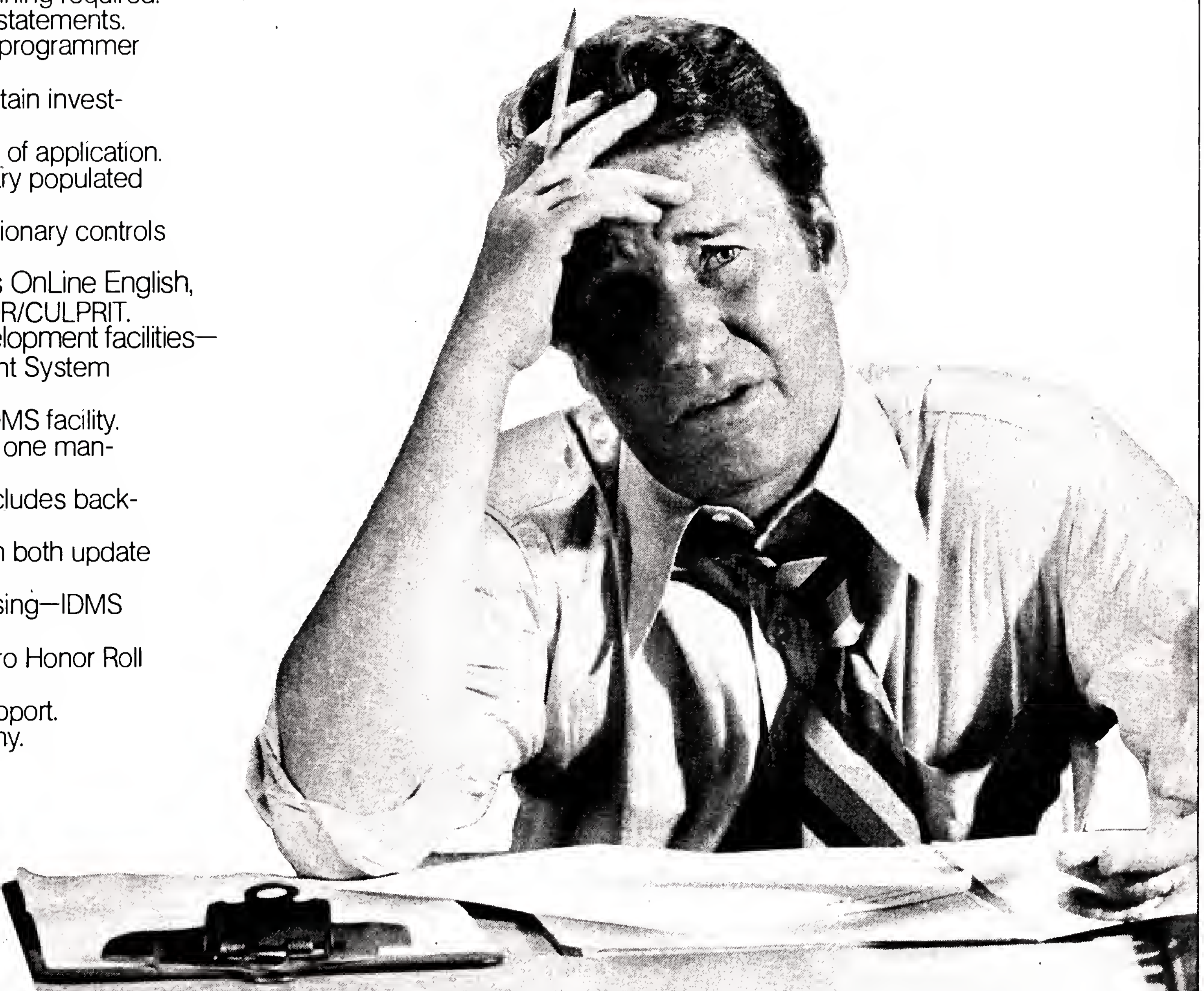
Edutronics/McGraw-Hill
55 Corporate Woods • 9300 W. 110th St.
Overland Park, Ks. 66210

Tell me more about an Edutronics/McGraw-Hill training investment
Name ______
Company ______
Title ______
Computer Hardware ______
Address ______
City ______ State/Province ______ Zip ______
Phone ______

Don't waste a year or more with IMS/DL1.

Go with IDMS now. Chances are you will later anyhow. Many firms are already converting from IMS/DL1 because IDMS applications are developed faster and run more efficiently. Here's why:

IDMS is easier to learn—only 3 days training required.
IDMS is easier to use—simple, English statements.
IDMS has DML Processors—improves programmer productivity five to one.
IDMS has IMS/DL1 ESCAPE Facility—retain investment in IMS/DL1 applications.
IDMS is very flexible—handles any type of application.
IDMS has an active dictionary—dictionary populated automatically.
IDMS has an integrated dictionary—dictionary controls all components.
IDMS has end-user facilities—includes OnLine English, OnLine Query, and EDP-AUDITOR/CULPRIT.
IDMS has automated application development facilities—includes Application Development System for on-line and batch.
IDMS has a DMS interface—supports DMS facility.
IDMS requires less support—as little as one man-month per year.
IDMS supports on-line applications—includes back-up, recovery and warm restart.
IDMS is very efficient—multi-threaded in both update and retrieval mode.
IDMS supports distributed data processing—IDMS has unique DDP architecture.
IDMS is the only DBMS to make Datapro Honor Roll 4 years in a row.
Cullinane is Number One in vendor support.
Cullinane is a financially strong company.
Cullinane is investing $15,000,000 in IDMS applications.
Cullinane is investing in an IDMS Data Center for IDMS users.



C Database Systems

FREE SEMINARS

Attend a free seminar in your area to learn the benefits of converting to IDMS. Tailored to management, these seminars also present the complete family of software systems from Cullinane.

Dates and Cities

MAY	
5	Roanoke, VA
5	Springfield, MO
6	Hartford, CT
7	Birmingham, AL
12	Bakersfield, CA
12	Grand Rapids, MI
12	Harrisburg, PA
12	Madison, WI
12	Tampa, FL
12	Toledo, OH
12	Winnipeg, MAN
14	Austin, TX
14	Montreal, QUE
14	Westbury, NY
19	Joplin, MO
19	Louisville, KY
19	New York, NY
19	Ottawa, ONT
19	Syracuse, NY
20	Buffalo, NY
21	Salt Lake City, UT
21	Jacksonville, FL
21	San Jose, CA
21	Southfield, MI
26	Pittsburgh, PA
26	Richmond, VA
26	St. Louis, MO
28	Albuquerque, NM
28	Cleveland, OH
28	Montpelier, VT
JUNE	
2	Chicago, IL
2	Des Moines, IA
2	Indianapolis, IN
2	Newport Beach, CA
3	Green Bay, WI
3	New Orleans, LA
4	Oklahoma City, OK
9	Atlantic City, NJ
9	Columbus, OH
9	Toronto, ONT
10	Poughkeepsie, NY
10	Winston-Salem, NC
11	Phoenix, AZ
11	Seattle, WA
11	Stamford, CT
16	Detroit, MI
16	Las Vegas, NV
16	New York, NY
16	Springfield, IL
18	Boston, MA
18	Halifax, NS
18	Minneapolis, MN
18	Piscataway, NJ
18	San Francisco, CA
23	Baltimore, MD
23	White Plains, NY
24	Washington, DC
25	Honolulu, HI
25	Providence, RI
25	Richmond, VA
JULY	
30	New York, NY

I'd like to attend your seminar on ____________ Date
in ____________ City
Name/Title ____________
Name/Title ____________
Company/Department ____________
Address ____________
City ____________
State ____________ **Zip** ____________
Phone ( ) ____________
My computer is ____________

CW/Apr. 20

Mail to: Rosalie Cope
Cullinane Database Systems, Inc.
400 Blue Hill Drive, Westwood, MA 02090
Phone (617) 329-7700

Database:Cullinane

Grim Future Seen for Firms Shunning CAD

CW at CAM-I

By Ann Dooley
CW Staff

CANNES, France — The introduction of computer-aided design (CAD) into a business may or may not always work, but if in the future a company doesn't accept the techniques, "the company will go broke," according to Peter Wilson of Lucas Industries, UK

Speaking here recently before an international gathering of CAD/CAM experts and beginning practitioners, Wilson warned that "CAD doesn't solve your problems, it just helps."

The event, sponsored by the Computer-Aided Manufacturing-International, Inc. (CAM-I) association, drew approximately 180 visitors, primarily from the U.S., Germany, and France. But representatives from as many as 20 countries were in attendance, including members from Japan, the Netherlands and Italy.

Fewer people want to work in industry, preferring instead to go into the service sector, according to Wilson, a group leader of the engineering computer group at Lucas Research Center. The working population, too, is steadily decreasing while increased productivity has become the rallying cry of the '80s.

Industry is generally recognizing computers as its best solution, Wilson said. First installed by the larger companies — since they have the capital with which to experiment — computers are being closely watched by the smaller firms, he said.

In the future, almost no company will be too small to implement CAD/CAM techniques, Wilson maintained.

"Overall, the sensible use of computer-based techniques can improve a company's efficiency by between 10% to 20%," he claimed.

But CAD systems must be chosen wisely, Wilson cautioned. It is essential that all parties concerned agree on the needs to be filled. "The new procedures should be able to solve more problems than they will create," Wilson noted.

Planning, evaluation, selection and installation should be attended to in detail, he told the audience. Installation is the most critical phase for the eventual success of the system.

Fear and resentment can be alleviated if everyone concerned has been involved in the process. Training should be thorough, and the old familiar system should be maintained for security reasons and as a backup system in case of any problem.

The results of the implementation will probably not be immediate, so a great deal of time and money must be spent on faith alone that the program will eventually be of benefit to the company, Wilson noted.

Social Problems

Certain social problems are created by the introduction of CAD, according to Wilson. They are currently impacting the shop floors, but these problems will climb the hierarchy, eventually "making most of middle management redundant [unemployed]," he said.

Wilson maintained that the move to CAD and CAM techniques is part of a vicious circle: People don't go into industry, so business brings in computers, so people don't go into industry because there are no jobs, he stated.

Clive Jenkins, from the Association of Scientific Technical and Managerial Staffs, UK, agreed that technical change is a central issue to the levels of employment.

Manufacturing employment in industrial countries has been slowing everywhere, Jenkins stated, adding that the future may hold a pattern of jobless growth in manufacturing. Accelerating technical change and capital-intensive techniques may replace more labor-intensive techniques, he told the CAM-I membership.

TeleVideo offers more standard features than any other terminal. Lease it from General Electric today.
GENERAL ELECTRIC COMMUNICATION EQUIPMENT LEASING AND SERVICE
MICROPROCESSOR CONTROL STD
UPPER/LOWER CASE CHARACTERS STD
DUAL INTENSITY STD
BLINKING FIELD/BLANK FIELDS STD
REVERSE VIDEO STD
NON-GLARE SCREEN STD
PROTECTED FIELDS STD
UNDERLINING STD
BLINKING CURSOR STD
TABBING STD
NUMERIC PAD STD

General Electric's broad line of data communication equipment includes modular designed, high performance TeleVideo CRT terminals now available for lease.

The TeleVideo 912 and 920 series offers you different models to choose from, each with more standard features than any other terminal available, including microprocessor control, reverse video, underline, tabbing, blinking fields, blank fields, numeric pad, protect and unprotect, conversational and block mode transmissions, and self test.

Extra features on some models include special function keys, choice of standard typewriter or teletype keyboards, or second-page memory. All models are available for lease now.

When you lease any data communication equipment from General Electric - modems, teleprinters, line printers, portable printers, CRTs, acoustic couplers, concentrators, intelligent terminals and other components - you get full GE service support from more than 60 locations nationwide. We analyze, lease, deliver, install, answer your call, maintain, stock, and repair.

If you aim to keep up with the best, let's get communicating today.

CALL THIS TOLL FREE NUMBER:
(800) 528-6050 Ext. 406
In Arizona call (800) 352-0458 Ext. 406

Or write to General Electric Company, Section 560-98A
Schenectady, NY 12345

Clip and save this number and address for all your data communication needs.

GENERAL ELECTRIC

While Bolstering Productivity

CAD/CAM Seen Reshaping U.S. Work Habits

By Ann Dooley
CW Staff

CANNES, France — Computer-aided design and manufacturing (CAD/CAM) technologies will be reshaping how we work and perhaps even how we perceive work. Such was the feeling of 180 CAD/CAM enthusiasts at a recent Computer-Aided Manufacturing-International, Inc. (CAM-I) conference here.

Although just beginning to take off, CAD/CAM in the future will affect employment practices and work habits in nearly every size business, according to conference speakers. Seen as a means of bolstering declining productivity and increasing its competitive edge, the U.S. government in particular is seeking numerous ways to automate industrial procedures in the aerospace, shipbuilding and electronics industries.

Currently the techniques are being tried in larger installations. Coalitions are being formed among private industry, academia and federal agencies to develop strategies which will spread the developing technology out to various businesses within an industry.

The U.S. Air Force's Integrated Computer-Aided Manufacturing (Icam) program is on the leading edge of the technology. Icam is geared directly toward increasing productivity in the aerospace industry by increasing analysis, design and construction of automated tools and software.

The Electronics Computer-Aided Manufacturing (Ecam) program is the first major CAD/CAM project to apply the concepts of the Icam program, according to Charles Patrick, director of Army marketing at Softech, Inc., Waltham, Mass. Ecam is intended to indentify and plan improvements in electronics design, manufacturing and testing. Its projected goal is to have a plan to identify technologies allowing a systematic transition between current practices and potential CAD/CAM and computer-aided testing (CAT) technologies.

Another Icam-like program — this one still in the planning stages — is the shipbuilding technology program which will be managed by the U.S. Navy. In addition to these programs, the U.S. Department of Defense plans to implement site-specific technology modernization programs to upgrade preselected manufacturing facilities, Patrick noted.

CAD/CAM techniques are also being implemented in the private sector. One of the largest such implementation programs is being conducted at the Boeing Company where the applications are based primarily around Boeing's 767 airplane design.

Integration of a variety of computer applications and systems is an important part of Boeing's CAD/CAM program. "No company can afford to start over, so existing equipment must be used," Chris Klomp, chief engineer of computing at Boeing stated. "We had no more procedures to follow on such a large scale."

Before and during the installation phase, Boeing trained 2,000 designers on the 767 project in itself, Klomp said.

Boeing's complex system is still too new to be able to determine its full benefits, but results so far show successful integration between interactive graphic systems and the parametric design programs and computing aids to design and manufacturing. Klomp believes that Boeing will have an excellent ability to effectively manage its expanding technology base because of the recent implementation.

Due to decreasing costs, burgeoning low-end hardware and a growing understanding of the concepts, CAD/CAM is now within the realm of small- and medium-size businesses, according to Peter Veenman of the UK's Shape Data Ltd.

CW
At CAM-I

Companies of all sizes are looking to CAD/CAM for answers to the endemic problem of too few skilled personnel. While other specific reasons may be cited by companies, this one problem is universal, he noted.

Since CAD/CAM techniques usually carry across department lines, smaller companies must be willing to face drastic changes in operations.

Few differences exist in the need for information between large and small companies, but it should also be remembered that "small companies do not necessarily mean small problems," Veenman said.

One of the most important problems facing a smaller company is cost, according to Veenman. The cost of a CAD/CAM system will represent a much larger proportion of a smaller firm's yearly turnover and so more pressure will exist for achieving visibly improved performance in a relatively short time.

The Wang VS computer puts the crunch on your data, without putting the squeeze on your staff.

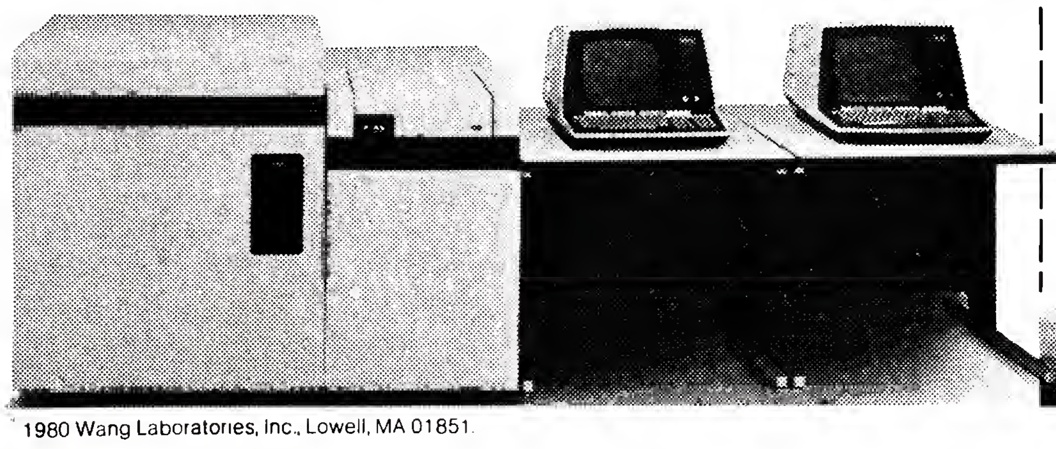
The Crunch.
High-volume information processing comes easy to Wang Virtual Storage computer systems. Virtual memory management gives each VS user a full megabyte of logical address space for big-program development and execution. Multiple Input/Output Processors work independently to break the I/O bottleneck, buffering the CPU for faster throughput. And our sophisticated VS instruction sets cut through complex tasks with ease.

Expansion is easy, too. The VS family lets you grow from 6-user support on the VS 50 to 32 users on the VS, to 128-user support on VS 100 systems. Use up to 2 million bytes of main memory and 4.6 billion bytes of mass storage. And get an eight-fold increase in processing speed with the VS 100's 32-bit processor, 64-bit data path and 32K-bytes of integral cache memory. While protecting your software and peripheral investment every step of the way.

Unsqueezed.
But Wang VS systems aren't just powerful computers. They're complete systems that make computer power ingeniously easy to use. Our programming aids, for example, let you create a data entry screen as easily as writing a word processing document. Our Symbolic Debug utility lets you test and modify COBOL, BASIC, RPG II and Assembler programs at the source level. And our menu-driven file management facilities let you set up files, process transactions, generate reports and establish field-level security controls — interactively.

In all, Wang VS systems give you more easy ways to use computer power than any other system marketed today. Word processing, phototypesetting, electronic mail and telecommunications are all VS system options.

Call us. And let your local Wang Representative show you how to apply the crunch. Without getting caught in the squeeze.



1980 Wang Laboratories, Inc., Lowell, MA 01851.

Send Solutions. DP112/CW4201
☐ Send more information on the Wang VS.
☐ Show me the VS in action.
Name ____
Title ____
Company ____
Address ____
____
Telephone ____
Mail to: Wang Laboratories, Inc., Lowell, MA
01851 (617) 459-5000

WANG
Making the world more productive.

Watch Computerworld on TV This Week:

A full half-hour devoted to the problems of the FAA's computerized air traffic control system.

- *What happens when the computer goes down?*
- *Is the system safe today?* • *How about tomorrow?*
- *Will 4,000 people die in the next decade if we don't do something now?*

City	Station	Channel #	Day	Time
New York	WPIX	11	Saturday	9:00 AM
Chicago	WSNS	44	Tuesday	6:30 PM
Los Angeles	KWHY	22	Saturday	12:00 Noon
San Francisco	KTSF	26	Saturday	9:30 AM
Boston	WXNE	25	Wed.	10:30 PM
Washington, DC	WDCA	20	Saturday	12:00 Mid.
Philadelphia	WTAF	29	**	10:30 PM
Dallas/Ft. Worth	KNBN	33	Tuesday	5:30 PM
Detroit	WXON	20	Saturday	10:00 AM
Minneapolis/ St. Paul	KMSP	9	Saturday	TBA*
Houston	KHTV	39	Monday	12:00 Mid.
St. Louis	KDNL	30	Sunday	5:30 PM
Atlanta	WANX	46	Tuesday	11:00 PM

*Check local listings for time.
**To be shown Wed. 4-22 at 10:30 PM this week only.

Security Software Design Begins at Home, Users Told

By Jeffry Beeler

CW West Coast Bureau

PHOENIX — Computing departments will probably never gain all the software security tools they need if they wait for the safeguards to become available from their vendors, according to a manager in Honeywell, Inc.'s customer education department.

To address some of their unmet software security needs, systems departments will probably be forced to develop at least a few of their data-protection aids on their own, John Flinn said here recently at Honeywell's seventh annual security and privacy symposium.

Speaking during the second day of the two-day conference, Flinn focused mainly on the software security requirements of distributed systems, which, because of their geographic dispersal, are usually much more vulnerable to penetration than their centralized counterparts.

Flinn urged users of distributed networks to think of security software as an application package like any other. To produce such a package, systems developers first have to create a software module he referred to as an "access control list" (ACL).

Heart of Security

As its name suggests, the ACL limits systems access and forms a security application package's heart or "kernel." A typical version of the module, which would necessarily differ from site to site, might consist of routines that perform the following functions:

- Check the validity of user identification codes.
- Prevent users from entering systems through unauthorized terminals.
- Make central systems inaccessible to outlying locations during off-hours.
- Restrict input and output to certain designated peripherals and communications links.
- Specify the peripherals that could be used for executing files.

A typical ACL might also include routines that would ensure each user has authorization to run programs, read data, update files and print output, Flinn said.

However, an ACL would serve only as a security software system's backbone and would probably require considerable support in the form of additional program modules. In his recent talk, Flinn briefly described 20 of these supporting modules, some of which might include a user identifier, an "obfuscator" and an automatic password generator.

A user-identifier program might work in the following manner: Before being granted permission to gain access to a system, each prospective user would be required to complete a questionnaire consisting of about 50 routine but obscure questions about his or her personal background. When the user later tried to come on line, he or she would be asked to respond to several of the questions, which the system would choose randomly.

If a user answered one or more of the identifier questions incorrectly, an "obfuscator" module might then delay and distract a suspected would-be violator by slowing down terminal response times and asking irrelevant questions, while triggering a silent alarm.

A third program module that might be used to support a security software system is a routine that would generate passwords automatically.

"Under poor information management practices, manually assigned passwords are archaic and worthless," Flynn said. "They can be easily lost, stolen or left lying around by careless users."

This announcement is not an offer to sell or a solicitation of an offer to buy any of these securities.
The offering is made only by the Prospectus.

April 6, 1981

1,000,000 SHARES

Barry Wright Corporation

COMMON STOCK
($1 Par Value)

PRICE $19.75 PER SHARE

Copies of the Prospectus may be obtained in any State in which this announcement is circulated only from such of the Underwriters as are qualified to act as dealers in securities in such State.

Blyth Eastman Paine Webber
Incorporated

Bache Halsey Stuart Shields Incorporated
The First Boston Corporation
Bear, Stearns & Co.
Dillon, Read & Co. Inc.
Donaldson, Lufkin & Jenrette Securities Corporation
Drexel Burnham Lambert Incorporated
Goldman, Sachs & Co.
E. F. Hutton & Company Inc.
Kidder, Peabody & Co. Incorporated
Lehman Brothers Kuhn Loeb Incorporated
Merrill Lynch White Weld Capital Markets Group Merrill Lynch, Pierce, Fenner & Smith Incorporated
L. F. Rothschild, Unterberg, Towbin
Salomon Brothers
Shearson Loeb Rhoades Inc.
Smith Barney, Harris Upham & Co. Incorporated
Warburg Paribas Becker A. G. Becker
Wertheim & Co., Inc.
Dean Witter Reynolds Inc.

Tightens Internal Controls

Foreign Corrupt Practices Act Called 'Blessing'

By Jeffry Beeler
CW West Coast Bureau

PHOENIX — Many computing managers find the Foreign Corrupt Practices Act burdensome and bewildering, but in the long run, the law may prove a blessing in disguise by forcing systems departments to tighten their companies' internal controls and accounting procedures.

That optimistic view was expressed here recently by Jerome Lobel, Honeywell, Inc.'s computing security manager.

Speaking on April 7 at Honeywell's seventh annual security and privacy symposium, Lobel reminded some 80 listeners that the exact meaning and legal ramifications of the Foreign Corrupt Practices Act remain unclear. Most of the uncertainty takes the form of unanswered questions like:

- What precautions should information systems managers follow to ensure that they and their companies are in strict compliance with the act's provisions?
- Under what circumstances might systems managers become liable to prosecution under the law?

Passed in late 1977 after three years of congressional debate, the federal act prohibits U.S. companies from bribing foreign officials and requires those firms to keep "reasonably detailed" financial records that "accurately and fairly reflect the issuers' transactions and assets." The law also mandates the creation of a system of internal accounting controls.

Severe Penalties

Violations of the act could result in individual fines of up to $10,000 and in prison sentences of up to five years, or both. Because of the severity of the penalties, Lobel urged systems managers and their employees to comply with the act as soon as possible.

For computing shop chiefs, the legislation apparently means that U.S. companies must make all their payments, both foreign and domestic, traceable or auditable and that systems must be designed to prevent unforeseen security breaches from destroying key data, Lobel said. The act also forbids systems managers or other company personnel from:

- Summarizing transactions or detailed data.
- Concealing bribes within larger, legitimate payments.
- Intentionally making systems difficult to audit.
- Improperly classifying or summarizing accounting systems.

When applied to daily practice, the law's provisions seem likely to have a profound and far-reaching impact on the way information systems managers do their jobs.

Suppose, for example, that a computing department's failure to install adequate backup or disaster recovery procedures resulted in the loss of data or programs indispensable to a criminal investigation. Under the Foreign Corrupt Practices Act, could such a predicament leave a systems manager open to prosecution? At present, no one can say for sure, Lobel said.

Another unanswered legal question concerns the definition of the term "internal controls," which seems to be used somewhat differently in the law than in the accounting profession at large. This apparent confusion over the term's exact meaning raises the possibility that a firm could still be considered in technical violation of the law even if it conforms to all generally accepted accounting controls, Lobel said.

But although the act presents computing department managers with many perplexing questions, challenges and potential legal pitfalls, it also has its probable advantages. By forcing systems managers to strengthen lax internal controls, backup procedures and disaster recovery plans, the law will likely enable companies to sharpen their financial management and thus improve their overall performance.

ACM '81 Slated For Nov. 9-11

LOS ANGELES — The Association for Computing Machinery (ACM) will host ACM '81 here on Nov. 9-11 and will feature a series of tutorials, panels and workshops as well as exhibits of the latest in computer-oriented products.

Immediately before and after the conference, the hosting ACM chapters will also sponsor seminars that will feature material on computer graphics, software engineering economics, security control and software quality assurance, the association said.

Registration fees for the three-day seminar start at $70 in advance for ACM members, with different fee arrangements for nonmembers, students and single-day attendees. More information is available from the Association for Computing Machinery, P.O. Box 24059, Village Station, Los Angeles, Calif. 90024.

Available Now!
ID-100/ Video Color Graphics Terminal

Plug to plug and fully software compatible with Digital Equipment Corporation VT 100 with superb high resolution video color display!

Call or Write

ID Systems Corporation

4789 Rings Road, Box 393/Dublin, Ohio U.S.A.
TWX 810-4821049
®VT100 Is a registered Tradmark of Digital Equipment Corporation

Operations Staffers Decry Management Slights

By Bob Johnson

CW New York Bureau

NEW YORK — If programmers and analysts supply the research and development needed to make a data center run efficiently, then the operations managers and operators supply the "street smarts."

That is the overwhelming sentiment of operations personnel interviewed by *Computerworld*, who feel that at times they are treated as second-class citizens instead of the professionals they feel they are.

Top DP management is often guilty of forgetting just how important the operations staff is in terms of how smoothly a DP shop runs, many operators told CW.

In addition to management neglect, operators also claimed they are often underpaid for their work when compared to programmers. Some operators also pointed to ergonomic difficulties with which they must contend every day, including machine room noise, faulty air conditioning, windowless working space and constant console monitoring.

Salary Inequities

The average annual salary for DP operators in New York, a traditionally high-paying area of the country, is about $15,000, according to Art Lawrence, head of Comtek, Inc., a New York employment agency. Senior-level operations personnel average $18,000 per year, Lawrence said. These figures are in sharp contrast to salaries paid to programmers and even programmer trainees, who sometimes start at the operator's senior-level salary.

The conventional wisdom is that programmers are a vital part of the computing function, responsible in large part for the success or failure of data processing.

Many operators acknowledged this, but in the same breath they claimed that they are just as vital — and sometimes even more important — to a company's successful DP operation.

Operations personnel pointed out that in a typical IBM shop with two CPUs, the console operator could be responsible for monitoring and controlling nearly 30 machine initiators running live jobs, for watching over the system's 16M-byte capabilities, for monitoring the performance of peripheral equipment and on-line networks and also for fixing minor software-related problems.

Operators said that their working knowledge is not confined to one small area of data processing. Many saw themselves as "jacks of all trades" with proficiency in hardware, software and communications; some even act as liaison between programmers and users.

Machine Jockeys

Today's operators no longer see themselves as simple "button pushers." Some affectionately referred to themselves as "machine jockeys." Many have risen through the ranks and are indeed highly skilled in a variety of systems and peripherals.

"Street smart" operators often have a "feel" for the systems they are running. Knowing how to correct a stretched tape (the pencil trick) or knowing when their system is not running at full capacity are intuitive habits, operators said. This intuition also helps in running certain jobs, operators claimed.

"I've seen operators catch programming mistakes many times," remarked Kevin O'Neill, senior operator at Bank of New York.

A feeling of professionalism can be conveyed to the operations staff through such things as salaries comparable to those of programmers, expanded benefits, regular promotions and individual recognition, operators said. What is also required is the involvement of operations management with top management.

"The key to successful operations management is the involvement of data center managers in all types of interfacing with higher-ups," said Gregory F. Brown, assistant vice-president for Citicorp's Travelers Checks data center.

New from GDC

THE ONLY BUSINESS-FEATURED MODEM UNDER $200

The GDC 103J-L

The only low-cost 300 bps dial modem
with the same features found in
modems which support business applications
...or your home computer.

Features:

- Operates over all telephone lines — even lines not usable by line powered units
- Data flow indication shows transmit and receive activity
- Carrier detect indication
- Answer/Originate mode is automatically selected — no need to manually switch
- Self diagnostics with Analoop® — loops data from terminal through modem to check operation
- Same high quality as our complete line of DataComm products.

For more information contact the experts at:

General DataComm Industries, Inc.
One Kennedy Avenue
Danbury, CT 06810
(203) 797-0711

General DataComm Industries, Inc.

General DataComm Industries (Canada) Ltd.
104-1220 Innes Road
Ottawa, Ontario K1B 3V3
(613) 745-9174

U.S. Sales Offices
Atlanta, GA (404) 955-0682
TWX: 810 7662256
Boston, MA (617) 462-6181
Chicago, IL (312) 298-4181

Cincinnati, OH (513) 748-8151
Dallas, TX (214) 980-0803
Houston, TX (713) 780-1480
New York, NY (201) 445-5626
Orlando, FL (305) 293-6817

San Francisco, CA (408) 998-2336
Santa Ana, CA (714) 957-0244
TWX: 910 595 1907
Seattle, WA (206) 838-1861
Washington, DC (703) 255-2882

Issue Unanswered by Inquiry II

Bell, Carriers Debate Protocol/Code Conversion

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Whether AT&T operating companies should perform protocol/code conversions directly or whether these activities should be handled by others was debated at length here this month in filings submitted to the Federal Communications Commission (FCC).

It is one of several questions left unanswered by the commission's Second Computer Inquiry Decision, issued last December. Since protocol/code conversion comprises a major part of the service rendered by U.S. value-added carriers, they would like to restrict the phone company's activities in this area. But there's another, much broader issue involved in the inquiry, according to Bell's competitors.

They say that if an AT&T operating company can convert the message-header codes that control communications between the ends of a data communications channel, Bell will be in a position to restrict the terminals that can be interfaced to the network, as well as the services that can be supplied by time-shared service bureaus, database vendors, and others who depend on the basic telephone network for long-haul transmission.

Standard Interface

To prevent this from happening, Bell's competitors say, a telephone operating company should be required to specify a standard interface which would then be implemented by all other suppliers, including the fully separated AT&T subsidiary organization established by the Computer Inquiry Decision. Protocol/code conversion needed to link the telephone network to particular terminals, computers, or intervening networks would be performed by the suppliers of these latter facilities rather than by the telephone operating company.

In its Computer Inquiry Decision, the FCC said that "basic" services — i.e., those offered by telephone operating companies, as opposed to their separate subsidiaries — could not include protocol/code conversion functions extending beyond the confines of the telephone network. Information input by a sender might be reformatted while traversing the network, but would have to leave the exit node in the same format it arrived at the entry node. However, the commission requested comments from interested parties on possible modifications of this provision, saying that if AT&T operating companies were allowed to perform some of the protocol/code conversion required by the user, it might permit attachment of additional terminals and thus increase the network's usefulness.

The Department of Defense (DOD) was among those submitting comments recently; it said AT&T should be allowed to offer protocol/code conversion as part of a basic service. The user would save money and be able to communicate more efficiently, DOD contended.

General Telephone and Electronics Corp. (GTE) which, unlike AT&T, is not required to offer enhanced services through separate subsidiaries, opposed any change. The company viewed "with some concern" the FCC's implication that "network efficiencies" may justify allowing protocol conversions "above the physical electrical level to be offered within a basic service. Such offerings would blur the boundary between basic and enhanced services beyond recognition."

AT&T said it would be "inconsistent and unreasonable" for the commission to prevent the nationwide network in the future from converting control signals that request service and perform other network control functions — such as addressing, flow control and error control.

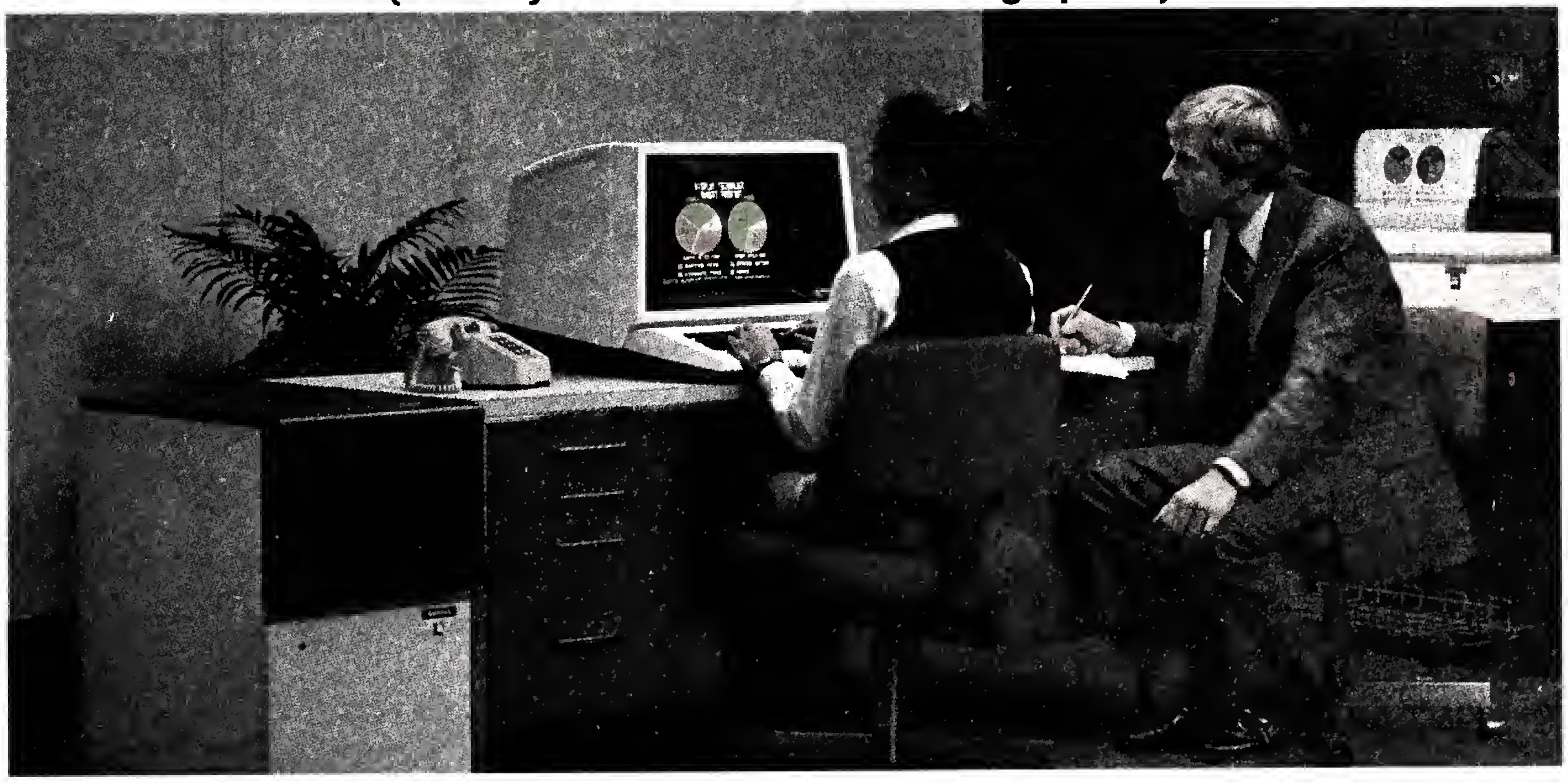
Adapso View

The Association of Data Processing Service Organizations, Inc. (Adapso) differed with this interpretation, however, insisting there is no need for the phone company to provide any protocol/code conversion service.

If AT&T decides in the future to provide a "basic" packet-switched service (as "basic" is defined by the FCC), it will not be any different, "at least from the user's perspective, than the 'basic' circuit-switching service AT&T provides today," Adapso said. "Information would leave the network with exactly the same code, protocol, speed, signal strength, and other characteristics with which it entered the network. Otherwise, the service would not be basic."

"What we're really saying here," explained an Adapso spokesman, is that AT&T should be required to establish a basic interface specification encompassing some but not all of the functions in Levels 1 and 2 X.25. All conversions to/from that AT&T specification would then be performed outside the Bell network by the fully separate AT&T subsidiary or by other suppliers."

Ask Ramtek.
(Nobody knows more about Colorgraphics)



See the difference a sharper image and more colors make in our new colorgraphics terminal.

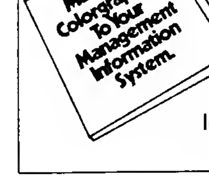
The 6212 displays the graphics output from your data base in clear bright images, letting you use color graphics in new, more powerful ways.

Add colorgraphics to your present MIS program. If your management is still relying on printouts or monochrome displays for information, the 6212 is the easy way to upgrade to colorgraphics. It uses a standard RS232C interface to your host computer, and is supported by many of the current graphics software packages.

High resolution lets you display more data. Greater resolution (up to 640 x 512 picture elements) means greater display performance. Consolidate and present more information in each display frame, without diminishing image clarity. Each terminal user can select 16 displayable colors from the 6212's palette of 64.

Our Colorgraphic Language (CGL) makes it easy. The 6212 is programmable in its own easy-to-learn set of English language commands. Users with no graphics experience can quickly move up to high-performance color graphics.

Look to Ramtek for more than terminals. If you need high-resolution business graphics with stand-alone computing, the Ramtek 6214 offers a complete system with floppy disk and UCSD Pascal.™ Ramtek has a complete line of colorgraphic and imaging products, including hard copy devices, monitors and colorgraphic printers. Plus a worldwide service network for support after you buy. For more information, write to Ramtek, 2211 Lawson Lane, Santa Clara, CA 95050.


Ask Ramtek
Matching Colorgraphics To Your Management Information System.

How do colorgraphics fit into your MIS picture? To help you evaluate the business graphics products on the market, Ramtek has prepared the booklet, "Matching colorgraphics to your Management Information System." It's Issue Number 5 of Ramtek's Use Our Experience Series. To get your free copy, write to Ramtek on your company's letterhead.

Ramtek
Our Experience Shows.

REGIONAL OFFICES—Santa Clara, CA (408) 988-2211, Los Angeles, CA (714) 979-5351, Albuquerque, NM (505) 884-3557, Dallas, TX (214) 422-2200, Houston, TX (713) 774-2233, Chicago, IL (312) 397-2279, Seattle, WA (206) 838-5196, Washington, D.C. (703) 893-2020, Cleveland, OH (216) 464-4053, Boston, MA (617) 273-4590, Metropolitan NY (201) 238-2090, Maitland, FL (305) 645-0780, Pittsburgh, PA (412) 931-2500, New York/Canada (716) 425-1742, The Netherlands 31 (0) 2968-5056.

After $650,000 Expenditure

Report Blasts State for Tax Program Failure

By Bill Laberis
CW Staff

ST. PAUL, Minn. — An auditor's report issued here late last month blasted the state Department of Revenue for its alleged failure to develop a functional computerized tax processing program despite spending more than $650,000 to do so. The report blamed poor management planning for the demise of the program.

The report of the Office of the Legislative Auditor concluded that the Revenue Department is in sore need of state-of-the-art DP equipment, but recommended the Minnesota State Legislature stop funding the department's computer projects until "a plan to resolve [the problems] be prepared."

As outlined in the report, the department's record on computer modernization spending is reminiscent of some federal Defense Department spending, with bankrupt, half-completed projects running months and years behind schedule. In the state's case, there may well be no more funding until the Revenue Department can prove it is more fiscally responsible.

The report's findings of the department's efforts over the past three years included the following:

- The computerized Individual Income Tax system was canceled last October, then two years overdue in implementation. Though original estimates had placed the cost of the system at $190,000, nearly $600,000 was exhausted on the project before cancellation, while the latest estimates of total cost had mushroomed to $1.6 million.
- The Corporate Income Tax system was canceled in June 1979, also two years behind schedule, after $80,000 was spent and estimates of total cost had more than doubled. Successfully implemented, the system could have increased corporate tax collections by $2 million a year.

Corporate tax returns are now processed manually with virtually no computer support, negating possible computerized controls and checks of corporate tax filings.

- The Declaration Match system was put on-line in February, but four years behind schedule and $225,000 over budget.
- The Master Business File system was completed on time, but $100,000 over budget.

"In the course of study, it became clear that the [Revenue] department's difficulties in systems development are related to management problems," the report said. "The decision to initiate the development of a new computer system is made haphazardly, with little thought given to the impact it will have on department objectives."

Last-Minute Changes

As a direct consequence of the department's failure to define what it wanted in a new system, it was unable to freeze the project design in any meaningful way. As a result, major changes were often introduced at very late stages of project development, the report found.

In addition, the department routinely failed to consult its legal counsel in the early going, resulting in the testing and even implementation of some new systems before it was discovered that statutory requirements were not being fulfilled.

And lastly, the department's stated commitment to the development of "huge computer systems when several smaller systems might have been equally effective and more feasible to implement" showed its inflexibility.

Department officials largely agree with the grim findings, but are nonetheless pressing ahead with efforts to secure more funding for computer modernization projects.

What Do All These Printers Have In Common?

Okidata Reliability

There are thousands of Okidata printers in computer rooms throughout the world. They were chosen by the top OEMs in the industry, chosen for value, performance, versatility, service and, most important, reliability.

Since 1972, Okidata has been building printers that outlast all the competitors. Compare our warranties. Microline serial printer heads are warranted for 200,000,000 characters. Slimline line printer heads are warranted for 500,000,000 characters. And, every one of them will run all day with no duty cycle limitations.

Okidata Slimline printers produce text and graphics using a unique shuttle bar mechanism that assures perfect horizontal and vertical dot alignment. Okidata Microline printers provide business quality and reliability at prices attractive even for personal use. Okidata document/passbook printers automatically adjust to suit form thickness. Now, Okidata Model 2350 and other new products add new dimensions to matrix printing.

From 80 to 350 characters per second, from 125 to 400 lines per minute, there's an Okidata printer that will add reliability to your system. Call or write today for the name of your local representative.

OKIDATA

Okidata Corporation
111 Gaither Drive
Mount Laurel, New Jersey 08054
609-235-2600

Okidata is a subsidiary of
Oki Electric Company, Ltd.

See the future of matrix printing!
NCC Booth 1248

Twelve-System Summary

Alpha Micro, North Star Lead Series 2 Ratings

By Hillel Segal
Special to CW

Top results in benchmark testing of computers in the less-than-$15,000 bracket go to two systems — one in the top end of the price range and another near the low end of the group.

Most impressive in its execution times was Alpha Micro, Inc.'s AM-1011, which scored first place in the scientific/engineering problem and third in the accounts receivable test.

Also outstanding was the North Star Computer, Inc. Horizon, which took first in its own group for accounts receivable, posting a time which bested the entire Series 2 group (priced $15,000 to $25,000) as well. The Horizon was second in Series 1 in the scientific/engineering problem. Its performance was especially notable in view of the system's relatively low price tag.

Other computers giving excellent results in benchmark tests conducted for the Association of Computer Users (ACU) included the Cromemco, Inc. System Two and Digital Microsystems, Inc.'s DSC-2.

Incomplete Picture

However, users should bear in mind that speed comparisons such as provided in the ACU's testing program cannot provide the entire picture of a system's suitability for a given application. Factors such as software, languages, storage capacity, expandability, and vendor support must be weighed just as carefully as throughput. For a fuller discussion of these topics, see the previous benchmark column in *Computerworld*, published April 6.

Now that we have presented the highlights of 24 benchmark reports in the pages of this magazine, we are now in a position to compare all of these computers to each other. They were tested using identical applications, in most cases in Basic. Some were tested in other languages, where Basic was not available. None were allowed to use an assembly language, though a few systems had a compiled language.

The results in some cases are surprising. In particular, lower cost systems seemed to do quite well in the accounts receivable problem, which combines diskette access operations with CPU operations in a mix intended to simulate a typical accounting application. It appears that brand name and price tag have little to do with execution time for such programs.

In the CPU-oriented scientific/engineering problem, more expensive systems did dominate the testing, and the Series 2 computers gained a decisive edge in speed. Extra cost, from the user's point of view, had gone into features which speeded mathematical computations rather than file access.

Nevertheless, other features, including business-oriented application software and vendor training, service and documentation, are outside the scope of our benchmark testing. Thus a system with seemingly lackluster speed may have significant capabilities in software which provide extra functions or which contribute to ease of use. Such extras are to some extent "intangible" and we leave their evaluation to the judgment of readers.

SCOREBOX

Series 1 Results*** Systems up to $15,000	C-1 (Scientific/ Engineering) Time	C-3 Accounts Receivable Time
Pertec PCC 2000	28:48.4	6:04.3
North Star Horizon	12:01.9	1:57.7
Cromemco System Two	14:52.6	2:48.0
Texas Instruments 771	22:05.4	3:38.1
Vector Graphic System B	19:30.0	5:56.5
Decstation 78	22:35 ****	5:04.8****
Radio Shack TRS-80 Model II	20:00.7	3:38.6
Apple II+	21:11.0	6:17.4
Digital Microsystems DSC-2	13:24.9	3:28.8
Ohio Scientific C3-A	12:10.7	15:49.3
Alpha Micro AM-1011	5:18.3	3:25.3
Data General CS/10 Model C1	58:21.0	*****

Series 2 Results*** Systems $15,000 to $25,000	C-1	C-3
IBM 5110	29:47.2	4:11.0
Wang 2200VP	2:05.8	3:20.0
Texas Instruments FS990/10	*	3:18.6
Hewlett-Packard System 45	4:38.9	5:05.8
DEC PDP-11V03	14:43.4	4:14.0
Q1 Lite	6:50.7****	5:03.3****
Univac BC/7-610	12:09.2****	10:37.0****
Northern Telecom 405	*	**
Datapoint 1170	38:27.5	6:50.4
Randal 100	13:52.4	10:05.0
Hewlett-Packard 250	4:05.9	4:45.7
Texas Instruments DS990/2	*	2:48.3

*Test could not be run because of memory limitations.
**Test could not be run because of formatting limitations.
***Both Series 1 and Series 2 were run on the same programs.
****Results include both compile and run-time.
*****Time of 2:40.3 was obtained using a hard-surface disk, which raised the system price to $17,400.

This is the 28th in a series of articles giving the highlights of benchmark tests conducted on popular small computer systems. The full reports were originally published by the Association of Computer Users, a 4,000-member nonprofit organization.

Systems Described

- **Pertec Computer Corp. PCC 2000:** Capability to expand to multiterminal use and add hard disk storage were notable features. The operating system is CP/M-compatible, allowing a wide selection of languages. Pertec offers its own software packages for business accounting, and the system is normally sold through local dealers which provide a complete hardware/software system. Benchmark performance was fair. Price: $12,270.
- **North Star Computer, Inc. Horizon:** Startling higher-priced systems with its I/O speed, the Horizon did well in nearly all the benchmark tests. It uses CP/M and has floating-point hardware (optional). A hard disk is also available. However, the system requires a more technically oriented user in order to take advantage of its features. Price: $6,911.
- **Cromemco, Inc. System Two:** Posting good to excellent benchmark times, the System Two has since been given faster floppy disk drives and an optional multiuser Cromix operating system. Lisp and RPG-II have been added to Basic, Pascal, APL, Fortran, Cobol and assembler, already available. The hard-disk System Z-2H was also tested and showed improved I/O times. Word processing and data base management software are available. Price: $9,275.

Correction

It has been brought to our attention that the times reported in *Computerworld* for the Decstation 78, in some previous issues, have been in error. The correct times are shown in the accompanying box.

- **Texas Instruments, Inc. 771:** A solid performer in benchmark testing, the 771 is most often sold through OEMs who supply a complete hardware/software package. TI provides Basic, TPL (terminal programming language) and utilities, but no user programs. With excellent communications facilities, the 771 is often used as a preprocessor for data entry jobs. Price: $12,100.
- **Vector Graphic, Inc. System B:** Once the firm's sole product, the System B has now been joined by the VIP, the 2800 and the hard-disk 3005. The System B uses a CP/M, Mdos or Mzos operating system, allowing a variety of languages. Benchmark performance was about par for the price: $8,995.
- **Digital Equipment Corp. Decstation 78:** Although not a benchmark standout, users felt the Decstation 78's ease of use and applications software were strong points of the system. Basic is compiled and has 16-digit accuracy. Offered along with word processing and accounting software, the system can be purchased from DEC computer stores and OEMs as well as the manufacturer. Price of $11,750 as tested was quoted by a computer store.
- **Radio Shack TRS-80 Model II:** Using 8-in. floppy disks, this is the biggest TRS-80 model offered and it can be purchased with accounting and finance software for small and medium-sized companies. Benchmark times were very good for the price: $7,648. Usable with CP/M or TRSDOS operating system, Cobol, Fortran and Compiled Basic are offered in addition to regular Basic and assembler.
- **Apple Computer, Inc. Apple II+:** Winner of the "low price tag" award, the Apple was not as fast as some systems, but did not finish last on any test. Excellent color graphics is a big feature, while 40-column uppercase-

(Continued on Page 32)

About the Author

Hillel Segal is president of the Association of Computer Users, a nonprofit association with members all over the U.S., Canada and several other foreign countries.

One of the association's key activities is the publication of its "Benchmark Reports." Each month a new report is produced covering another computer system.

In addition, ACU published seven bimonthly newsletters for users of small computers, midi computers, large computers, time-sharing systems, distributed processing systems, word processing systems, and home and hobbyist computers.

A complete package of information about the benefits of membership in the Association of Computer Users is available from them at P.O. Box 9003, Boulder, Colo. 80301.

GAO Slams Judicial Center for Poor Homework

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Efforts to relieve the federal court system's administrative burden through automation are not reaching their full potential because of poor planning and inefficient developmental practices, the General Accounting Office (GAO) reported recently.

Surveying the work of the Federal Judicial Center — the research and development arm of the federal judiciary — the GAO said, "The center has spent millions of dollars developing software systems and acquiring hardware without knowing whether the benefits were worth the cost."

The center is charged with developing and implementing a number of computer-based systems, collectively known as Courtran, to, among other things, facilitate case-flow management, automate docketing functions, provide judicial information and track disposition of criminal, civil and appellate cases through the federal courts.

As of last July, all district and appellate courts were using one or more Courtran systems, including commercially acquired word processing systems, but only 35 out of 95 district and four out of 11 appellate courts were testing or using one or more systems developed by the center.

Although center expenditures through fiscal 1981 will exceed $24 million, GAO said, and "conversion to automated systems have been tested at great length, progress toward moving systems out of the developmental stage and into full operation remains negligible."

After surveying the center's activities, the GAO criticized it for failing to:

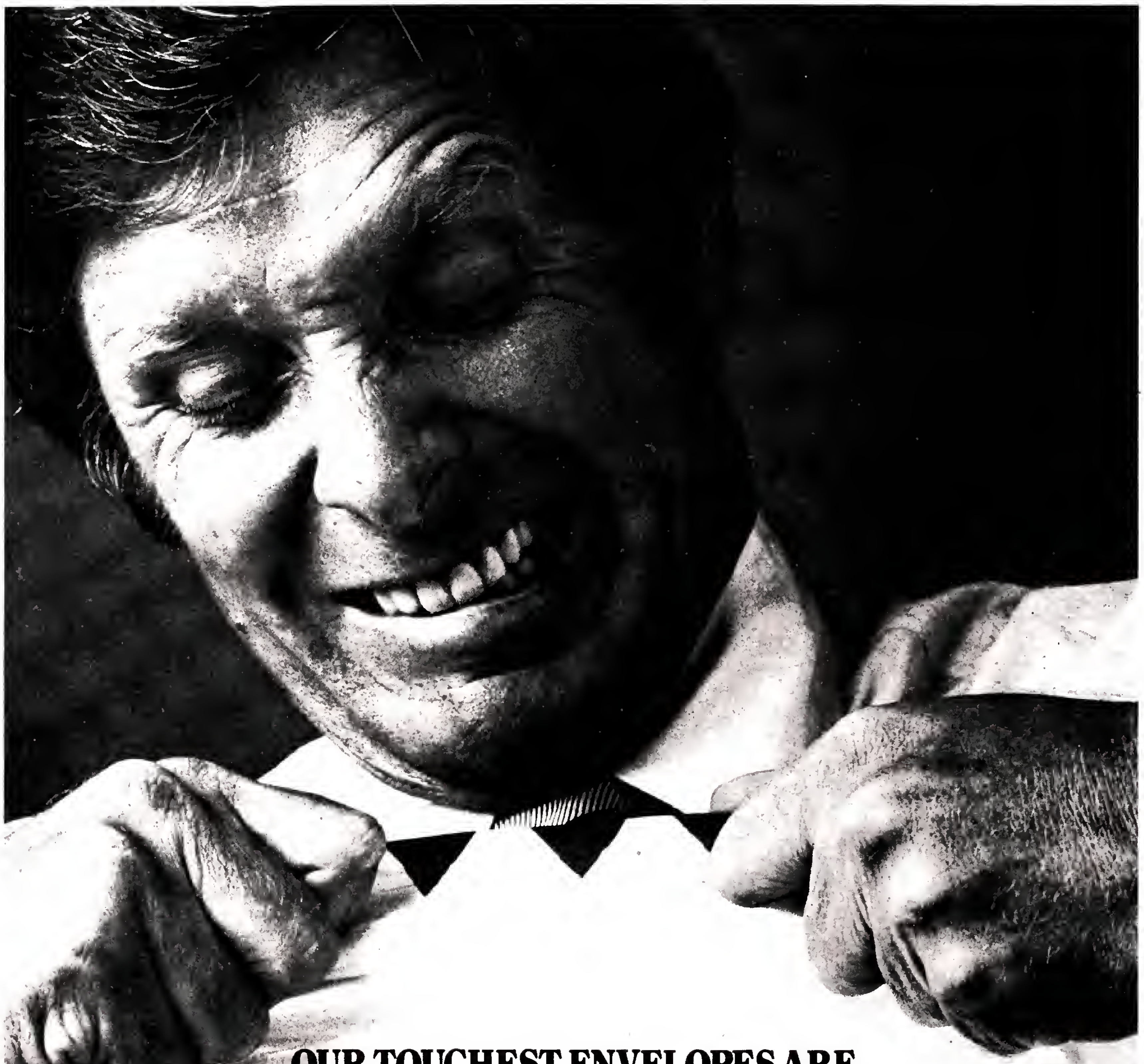
- Adequately define courts' information needs.
- Perform feasibility and cost-benefit studies.
- Use good implementation practices, resulting in expensive test periods that are longer than necessary.
- Prepare conversion plans and procedures.
- Validate systems before placing them into extensive use.

ACU Looks At Systems

(Continued from Page 31)

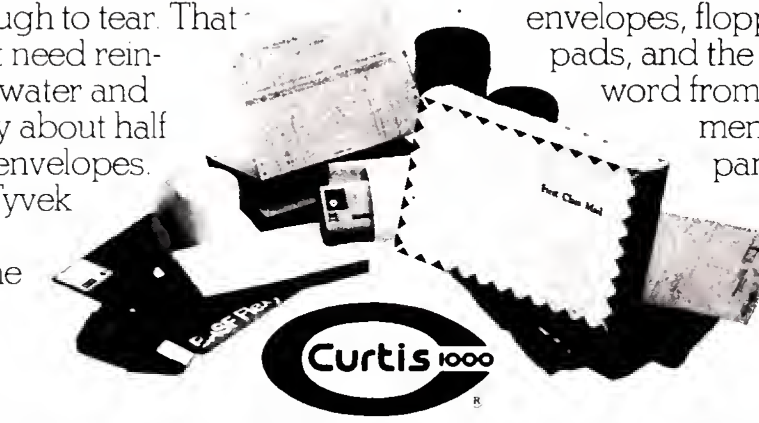
only screen characters are a drawback (optional 80-character expansion is available). Pascal, Fortran and integer or floating-point Basic are offered; tests were done in floating-point (Applesoft) Basic. Price: $4,535.

- **Digital Microsystems, Inc. DSC-2:** Significant storage expansion using hard disks and a head-per-track option were outstanding features of the DSC-2. However, Digital Microsystems has replaced the DSC-2 model in their lineup with two systems, the DSC-3 and DSC-4. Price of the DSC-2 system tested was $9,085; the DSC-3/101 with 10M-byte hard disk (less printer) is $8,995.
- **Ohio Scientific, Inc. C-3A:** Overall excellence in the benchmark testings was belied by a poor time in the accounts receivable test caused, our consultants speculated, by use of a single buffer for I/O. The problem could be programmed around, they said. The C-3A and hard-disk-equipped C-3B can be expanded to multiuser/multitask configurations. Price: $10,440.
- **Alpha Micro, Inc. AM-1011:** Nudging just over the stated class limit at $15,605 (we shoehorned it in anyway), the Alpha Micro provided some of the fastest benchmark times tested in this series. In addition, the compiled/interactive Basic had strong features, and the computer sported floating-point hardware, a real-time clock and excellent utilities. Multiuser operations are available and hard disk expansion is offered.
- **Data General Corp. CS/10 Model C1:** The only system tested in Cobol this series, the CS/10 is software-compatible with other commercial systems from DG. Tested with optional hard disk, its accounts receivable time was good (2:40.3), but price went from $15,500 to $17,400.



OUR TOUGHEST ENVELOPES ARE OUR LIGHTWEIGHT, POSTAGE SAVING TYVEK® ENVELOPES.

For extra protection and postage savings, get the envelope that's too tough to tear. That won't burst open, doesn't need reinforcing tape. That resists water and chemicals. And that's only about half the weight of kraft paper envelopes. All because it's made of Tyvek spunbonded olefin from Du Pont. Curtis 1000's line of Tyvek envelopes is but one of a mile-long list of products—forms, envelopes, floppy disks, ribbons, binders, pads, and the like—that help you get the word from person to person, department to department, and company to customer. In essence, we supply things to make business work. We've been at it for nearly a hundred years.



Curtis 1000®

1000 DIFFERENT PRODUCTS TO MAKE BUSINESS WORK.

For samples, call your Curtis rep or write Jack Holloman, VP-Marketing, Curtis 1000 (CU-TTL3), Smyrna, Georgia 30080.

Taught by IBMer

Relational Data Base Topic of ACM Seminar

By Lois Paul
CW Staff

WELLESLEY, Mass. — Relational data base was the topic of discussion at a professional development seminar here last week taught by C.J. Date of IBM's General Products Division (GPD), San Jose, Calif.

The seminar, which drew about 150 DP professionals, was sponsored by the Association for Computing Machinery's (ACM) Greater Boston Chapter.

Entitled "Trends in Data Base Management," the seminar included a discussion of IBM's SQL/DS as a sample relational system, as well as a review of the basic relational model and topics such as normalization, recovery and concurrency.

All participants received a copy of Date's third edition textbook, *An Introduction to Database Systems*, published by Addison Wesley.

Date defined a relational data base as one "that is perceived by the user as a collection of tables. The big point I want to get across," he said, "is that the relational data base is simple."

A basic difference between a relational and nonrelational system, according to Date, is that a relational system at least has to support a "join." The user can select data from multiple tables with one select statement.

"A relational data base is a data base that is perceived by the user as a collection of time-varying, normalized relations of assorted degrees," Date said.

The seminar is the first one ACM has held at Wellesley. Future sessions are scheduled for May 2 and May 16 at Framingham State College in Framingham, Mass. "Technical Writing and System Documentation" is the topic for May 2, which will be taught by Bruce Herzberg and Esther Martin. On May 16, Peter Wegner will conduct a seminar entitled "Programming With Ada."

The sessions are held on Saturdays from 8:30 a.m. to 4:30 p.m. and cost $50 for members of ACM's Greater Boston Chapter members and $55 for nonmembers. The price includes lunch and generally a textbook or text materials.

Further information is available from ACM through P.O. Box 465, Lexington, Mass. 02174.

Program Planned On CAD/CAM

BETHLEHEM, Pa. — Lehigh University, with $2.5-million support from private industry, is developing an educational program for about 600 undergraduate students centered around two laboratories, one dedicated to computer-aided design (CAD) and the other to computer-aided manufacturing (CAM).

"Our goal is to implement computer engineering technologies into most of the undergraduate courses in the college. The new CAD and CAM laboratories are being hardwired to many of the departments' classrooms," according to Dr. Douglas E. Abbott, coordinator of the program at Lehigh.

The two laboratories will be establishing curriculum material to meet industry requirements, according to the program directors.

"We are removing the slash from CAD/CAM," Dr. John Ochs, director of the CAD laboratory, said. "The aim of the program is to present state-of-the-art computer graphics and other computer-aided engineering systems as tools to improve engineering and manufacuturing productivity."

Dr. Emory W. Zimmers Jr., director of the CAM laboratory, conducts seminars with different companies to promote exchange of technology and information.

Among the firms supporting the CAD/CAM program are McDonnell Douglas Automation Corp., American Can Co., Applicon, Inc., Control Data Corp., Fairchild Industries, Inc., General Electric Co. and Mobil Corp.

DEC* Analyzed!

* * * * * *

Monthly Newsletter.

Monosson on DEC is a monthly newsletter devoted to DEC, to understanding DEC, to analyzing DEC products, DEC policies, DEC services, DEC management, and where DEC is headed, representing the collective research of an organization operating exclusively in the DEC marketplace.

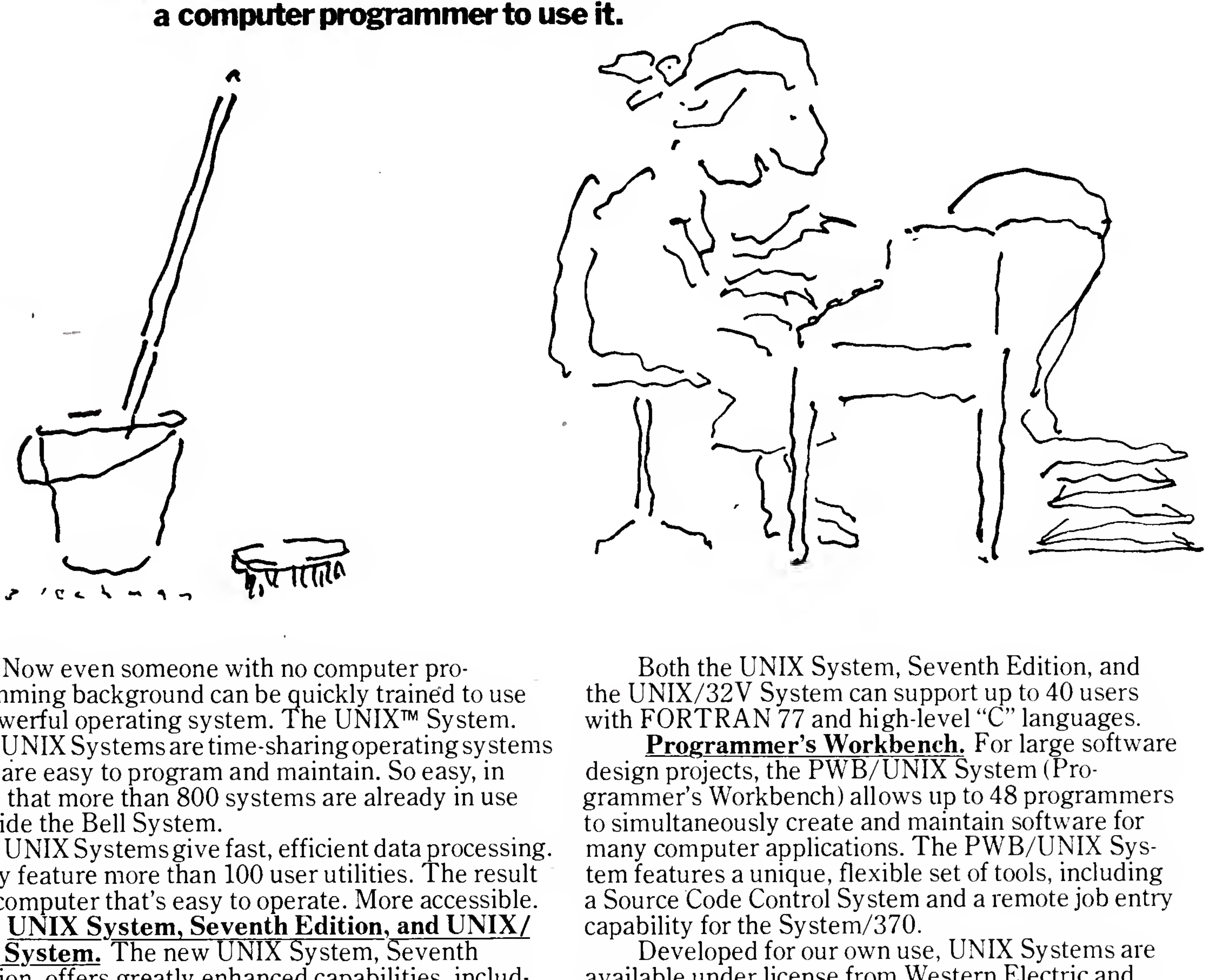
SPECIAL Introductory Offer.
Six-month subscription (six issues) for $95. Send your check now and receive our complimentary wall chart guide to DEC's matrix management organization.

Monosson on DEC

712 Beacon Street Dept CW-420 Boston, MA 02215
(617) 437-1100

*DEC is a trademark of Digital Equipment Corporation

Now there's a computer operating system that doesn't require a computer programmer to use it.



Now even someone with no computer programming background can be quickly trained to use a powerful operating system. The UNIX™ System.

UNIX Systems are time-sharing operating systems that are easy to program and maintain. So easy, in fact, that more than 800 systems are already in use outside the Bell System.

UNIX Systems give fast, efficient data processing. They feature more than 100 user utilities. The result is a computer that's easy to operate. More accessible.

UNIX System, Seventh Edition, and UNIX/32V System. The new UNIX System, Seventh Edition, offers greatly enhanced capabilities, including a larger file system and inter-machine communications. The Seventh Edition is designed for PDP-11 minicomputers. For those needing its capabilities on a larger machine, the UNIX/32V System is presently available for the VAX-11/780. The Seventh Edition's improved portability features allow users to adapt it more easily to other computers.

Both the UNIX System, Seventh Edition, and the UNIX/32V System can support up to 40 users with FORTRAN 77 and high-level "C" languages.

Programmer's Workbench. For large software design projects, the PWB/UNIX System (Programmer's Workbench) allows up to 48 programmers to simultaneously create and maintain software for many computer applications. The PWB/UNIX System features a unique, flexible set of tools, including a Source Code Control System and a remote job entry capability for the System/370.

Developed for our own use, UNIX Systems are available under license from Western Electric and come "as is". With no maintenance agreements, no technical support.

For more information about UNIX Systems or other Bell System software, complete the coupon and mail to Bell System Software, P.O. Box 25000, Greensboro, N.C. 27420. Or call 919-697-6530. Telex 5109251176.

PDP and VAX are trademarks of Digital Equipment Corporation.

To: Bell System Software
P.O. Box 25000, Greensboro, N.C. 27420

Please send me more information about Bell System software packages.

☐ **UNIX Systems.** ☐ **Other Bell System software packages.**

Name__________
Title__________ Company__________
Address__________
City__________ State______ Zip______
Telephone__________ Hardware__________

CW-2

UNIX is a Trademark of Bell Laboratories.

Industry Asks Information Adviser to President

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Commenting on legislation to create a White House Council on International Communications and Information, representatives of the DP manufacturing and service industries have proposed instead a scaled-down approach to international information issues.

A special adviser to the President, backed by a staff of no more than five persons, could effectively promote a coordinated response to these matters, spokesmen for the Association of Data Processing Service Organizations, Inc. (Adapso) and the Computer and Business Equipment Manufacturers Association (Cbema) told a House subcommittee April 2.

The Government Information and Individual Rights Subcommittee held two days of hearings on a bill proposed by its chairman, Rep. Glenn English (D-Okla.), that would set up the more elaborate council to serve as the agency primarily responsible for transborder data-flow restrictions and related issues [CW, April 13].

'Heartily Concur'

Adapso representative Richard Crandall, president of Comshare, Inc., Ann Arbor, Mich., said "we heartily concur with the subcommittee's finding that this nation has no coordinated policy regarding [information] trade barriers and other restrictions and the problems they create for the United States and its political, social and economic interests."

But, he continued, because these problems are "increasingly serious and likely to grow in magnitude and because foreign governments and policies which have caused these problems are already in place, we are anxious for a solution in the shortest time possible."

Therefore, Adapso proposes "a less costly and less cumbersome solution to the Council on International Communications and Information," Crandall said, suggesting "a special assistant to the President for communications and information be created."

The new office would be successful, he said, because of "the proximity to the President, a small but effective professional staff, and the necessary authority to investigate, review and coordinate the activities of other governmental agencies involved with international communications and information issues.

"The very establishment of such an office so close to presidential authority could in itself lessen trade barriers," Crandall added. "The mere fact that the U.S. has finally taken notice would do wonders."

Cbema President Vico Henriques also declined to support the English bill as now proposed, although he said the association believes "the United States is incorrectly organized to adequately manage or coordinate the multifaceted issues of international information flow."

Like Crandall, Henriques advocated appointing a small office of "Advisor to the President on International Communications and Information . . . charged with the responsibility of being the administration's adviser for international flow matters."

Cbema Monthly Report Covers Privacy Legislation

WASHINGTON, D.C. — To keep track of all the privacy and security legislation pending in the state and federal legislatures, you need either a computer or the " Federal & State Legislation Status Report" issued bimonthly by the Computer and Business Equipment Manufacturers Association (Cbema).

The report, which for several years has tracked privacy and security legislation in the states only, this year includes data on such bills at the federal level as well.

The 26-page February issue, which describes and tracks 16 bills at the federal level and 51 bills in various state legislatures, also contains a store of useful information, including two-and-one-half pages of Senate and House office telephone numbers for acquiring additional information.

The current report indicates that of the 16 bills introduced in the House as of mid-February, 11 were sponsored by Rep. Barry M. Goldwater Jr. (R-Calif.), "the sole-surviving privacy advocate in Congress," according to the booklet's introduction by Cbema Director Lloyd S. Kaufman.

Massachusetts Leads

Of all the state legislatures, Massachusetts leads with the greatest number of bills submitted in the area of privacy, according to the report. The areas of greatest concern to those states having legislative proposals dealing with privacy are the inspection of government, financial, phone and credit records, the report noted.

"The other popular issue is the area dealing with the use of medical and health records," the introduction continued, adding that legislation submitted to date in the various states is running even with legislation submitted during the 1979-80 period. It is noteworthy that of the 111 bills tracked by Cbema's Privacy and Security Committee in 1980, only six were enacted.

Besides the descriptions and telephone numbers for further information, the report contains the 1981 State Party Control for every state, the 1981 legislative session schedules for every state and the Zip Codes and telephone numbers for every state capitol in the nation.

The report is available free of charge from Cbema at 1828 L St. N.W., Washington, D.C. 20036.

IBM 3101 ASCII TERMINALS
and "PROTOCOL" 1067
ASCII to SNA/SDLC Convertors
IN STOCK
RENT·LEASE·BUY
FREE TRIAL PERIOD
Call now for details on the best deal in town
1-800-345-8278
Newcorp Products, inc.
45 Commerce Drive
Aston, PA 19014
215-485-8180

IMS SYSTEMS ANALYSTS & PROJECT MANAGERS

MAYBE IT'S TIME FOR A MOVE TO BOEING.

If your career is not moving along like clockwork, you should get in touch with Boeing.

Boeing Computer Services has immediate openings for systems analysts and project managers to work on the design of a material procurement and control system for use in planning, acquisition, control and disposal of materials on a worldwide scope.

Just check your qualifications against those required for the assignments below.

Accepted candidates will be assured attractive pay, excellent benefits and opportunity for career advancement.

Send your résumé to The Boeing Company, P.O. Box 3707-LAM, Seattle, WA 98124.

An equal opportunity employer.

WE HAVE THESE OPENINGS RIGHT NOW:

IMS SYSTEMS ANALYSTS

Job involvement includes definition, system specification and documentation. Knowledge of COBOL, experience with large on-line systems (IBM 370/158 or larger) or IMS DB/DC experience is required. Materials management applications background or manufacturing, inventory control and equipment maintenance backgrounds preferred. Applicants should have three to five years' related experience.

IMS PROJECT MANAGERS

Applicants are required to have experience with large scale on-line systems (IBM 380/158 or larger). IMS DB/DC, materials management systems and project manager's experience is preferred.

BCS BOEING COMPUTER SERVICES COMPANY
A Division of The Boeing Company

FOR SALE
DEC
NEW!
• DZ 11A
• DZ 11C
• DH 11AD
• DH 11AE
IMMEDIATE DELIVERY
800-854-0350
(CALIF. 714-632-6986)
DATALEASE R
The DEC Specialists©
CALL NOW!

To Use CPUs, Collection Agencies

CPUs Helping Track Student Loan Defaulters

By Bill Laberis
CW Staff

WASHINGTON, D.C. — The U.S. Department of Education is stepping up its computer-assisted efforts to put more student-loan defaulters on a paying basis with Uncle Sam. In the process, the government will implement two pilot programs slated to use outside collection agencies.

But most of the Justice Department's 95 U.S. attorneys' offices across the country, which receive from other government agencies over 15,000 of the toughest student-loan default cases a year, are constrained in their collection efforts by relatively unsophisticated word processing systems that function mainly as off-line bookkeeping aids.

Depending on who's doing the counting, anywhere from $1 billion to $2.2 billion in federally guaranteed loans are presently in arrears — money already paid out by the federal government to the banks and other institutions who made them. That's enough money to pay a year's tuition for about 400,000 full-time boarding students.

And with President Reagan and federal budget director David Stockman aiming to slice away much of the guaranteed-loan program, the importance of recovering defaulted loans now is paramount, according to a U.S. Education Department official.

Streamlining Process

"Since 1977 when we started using computers in a big way, we have been streamlining the collection process to be more sophisticated and responsive," said Nazzerino "Nat" Coluzzi, special assistant to the deputy assistant secretary for student financial assistance at the Department of Education. "We're making it better, but the scope of the problem is getting bigger all the time as loan need rises with rising school costs."

The department's collection record bears out the rewards of a computer-assisted collection process.

In the 10-year period between 1966 and 1976, the department collected a total of $25.7 million in defaulted loans. But at the end of 1978, the first full year of computer-aided collecting, the department amassed $15.7 million in previously defaulted loans, a figure that soared to $42 million the following year.

"You can see the difference when the full forces of the computer were turned on," Coluzzi remarked.

Initially the department's system was programmed to walk the collection process through its various steps automatically. It prepared, calculated and printed out monthly bills sent to the last known address of a debtor who, if he did not pay up, would then be sent a series of computer-written collection letters.

Data entry has been handled on-line by an IBM 370/168 owned by Boeing Computer Services, which has contracted with the department for all batch processing and printing. Boeing's system is configured with MVS-TSO with CICS and IDMS, a department spokesman said.

If the collection letters failed to produce favorable results, the system would then refer the case to the Internal Revenue Service's automated Address Locator System. Cases involving defaulters not located, or people found but who refuse to pay, are referred to a branch of the U.S. Attorney's Office for collection or prosecution.

More recently the department has successfully run computerized search and match programs, running the employment records of federal workers and military personnel against student-default records.

A first match of all employees of the former Department of Health, Education and Welfare turned up only 317 offenders, some of whom were paying sporadically on their loans. But a subsequent search and match of some 2.8 million other federal workers kicked out 6,600 offenders; still another match using military records turned up 10,700 defaulters in the armed forces. Coluzzi said the average defaulted loan totals about $1,000.

Pilot programs in Atlanta and San Francisco set up by the department will use the efforts of private collection agencies in locating defaulters while it fine tunes its own collection process, Coluzzi said.

Though not necessarily less aggressive in its attempt to collect from student-loan defaulters, the U.S. Justice Department clearly has not developed the technological expertise seen in the Education Department. The U.S. attorney's offices get the unsolvable cases from the Veteran's Administration and other government agencies as well as from the Education Department.

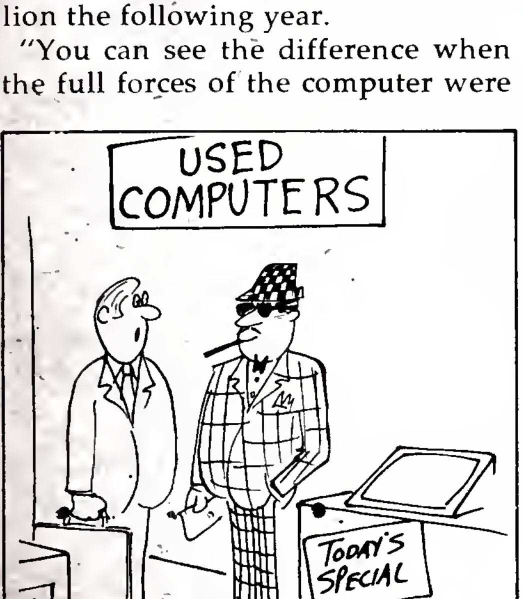
"Ours is a 1940 computer in a 1980 plastic box," said James Moore, supervisor of claims adjustment and enforcement at the the U.S. attorney's office in Detroit. "Virtually every U.S. attorney's office in the country has some sort of computer system up and running, but they are assisting in the bookkeeping and not too much else."

Moore said the offices are shackled by budget restraints, although more sophisticated DP techniques would "certainly be cost-effective."

Moore said an on-line electronic tracking system linking all 95 attorney's offices would be an ideal situation, but added he doesn't "foresee that happening for a long time."

One reason for the delay was given by Pat Goodrich, assistant director at the Executive Office for U.S. Attorneys. "Such a system would have to have more in it than just collection information," she said. "And I don't want people dialing up our computers to get it."

Goodrich said her department is working on a pilot program of its own, one designed to go beyond simple word processing and to include an on-line accounting system capable of doing arithmetic functions, although not necessarily capable of running search and match programs.



'Didn't You Once Sell Me a '72 Chevy?'

TWO POWERFUL WINGS— HARDWARE & SOFTWARE
TOGETHER A GREAT SOLUTION

Wing One: The DEC PDP-11 family of computers utilized by manufacturing operations worldwide.
Wing Two: NCA's MS-11 and FS-11 Systems Both fully integrated manufacturing and financial systems that provide data security, flexible line inquiry, and report program generation.
In Flight: Bottom-line features In our MS-11 manufacturing system: inventory control, purchasing, bills of material, work order status, manufacturing cost, material requirements planning, shop routing and capacity planning.
In our FS-11 financial system: order entry/invoicing, sales analysis, A/R, A/P, general ledger and fixed assets.
In Flight: Bottom-line benefits like tighter control over costs, inventory and scheduling.
The Proof: The "NCA User's Group" Apple to Siemens, Budd Company to Canadian GE, DEC, Mitel Corporation, Allis Chalmers ... over 100 installed sites worldwide

Fly With the Best! **Clip this coupon or call us today. (408) 245-7990**
NCA Corporation 388 Oakmead Pkwy, Sunnyvale, CA 94086
Please send complete brochures and your 1981 calendar.
Name
Company
Title
Address
City/State/ZIP
Area Code
Phone

Terminals WHEN:
One day shipment guaranteed!

TTY
TTY-43
TTY-43ASR

RACAL-VADIC
All Models

VT-100
VT-52
DEC
LA-34
LA-36
LA-120

TI
TI-745
TI-765
TI-820

DIABLO
630
1640/50

PERKIN-ELMER
551
1100
1200
1251

LEAR SIEGLER, INC.
ADM-3A+
ADM-31
ADM-42

QWIKTERM®
Your single source for brand-name terminals.
BOSTON (617) 246-1665
P.O. Box 185, Lynnfield, MA 01940
CHICAGO (312) 595-7733
284 West Devon Ave., Bensenville, IL 60106
NEW YORK (212) 564-7731
2 Penn Plaza, New York, NY 10121
SAN FRANCISCO (415) 461-0923
1100 Larkspur Landing Cir., Larkspur, CA 94939
WASHINGTON, D.C. (703) 522-1210
1555 Wilson Blvd., Arlington, VA 22209

Keypunch Simulator Redefines 'User-Friendly'

By Robert L. Glass
Special to CW

SEATTLE — What's as old as the keypunch but as new as the microcomputer?

It's Spike (Standard Peripheral Interface for Keypunch Emulation), the new keypunch simulators that runs on a microcomputer at a University of Washington Computer Center here.

Spike is a solution to two problems — there is a severe shortage of keypunch machines at the university, and the ones available are in pretty bad repair. Spike is a Zenith Z-19 micro tied to a Digital Equipment Corp. VAX-11/780. The micro provides the keypunch simulation, and the actual card punching is done in the background by the VAX processor.

That may not sound all that exciting, but the implementation of Spike elevates the term "user friendly system" to the level of an art form. First of all, when the pseudo-keypuncher signs on the system, what appears at the top of the micro's display screen is a carefully-drawn image of the traditional keypunch card.

As the keypuncher hits the appropriate keys to encode the desired information onto the card, the image has little card-chip size holes blacked-out on the screen for each key hit. The result looks like a completed punched card. But the pseudo-keypunch is actually an improvement over the real thing. For one thing, it is possible to backspace and repunch without having to scrap the "card." For another, using text-editor-like facilities, it is possible to "gang" information from one card into a sequence of others.

And all the flavor of the traditional keypunch remains. There is a simulated drum card, feed mechanism, release of the completed card and even a simulated card hopper.

Where do the completed punched cards actually come out? From the batch facilitated of the VAX computer, with a typical turnaround of about 15 minutes.

Spike is one of those technological advancements with results that are both better and cheaper. The micro is cheaper than the keypunch hardware it replaces, occupies less space, saves money on punch-card wastage and increase the productivity of the keypuncher.

Colleges Offered TRS-80 Deal For ETS System

FORT WORTH, Texas — Radio Shack Corp. has announced an agreement with the Educational Testing Service (ETS) of Princeton, N.J., to offer discounts on TRS-80 Model II microcomputers to colleges and universities using the ETS System of Interactive Guidance and Information (Sigi).

Sigi is a microcomputer-based career guidance system. Reportedly the only system of this type to run on a microcomputer, Sigi was developed at ETS with funding from the Carnegie Corp. and the National Science Foundation. Its conversion to the TRS-80 Model II was supported by a grant from the Kellogg Foundation.

Under terms of the agreement, schools that want to use this service are eligible for special pricing on equipment from Radio Shack.

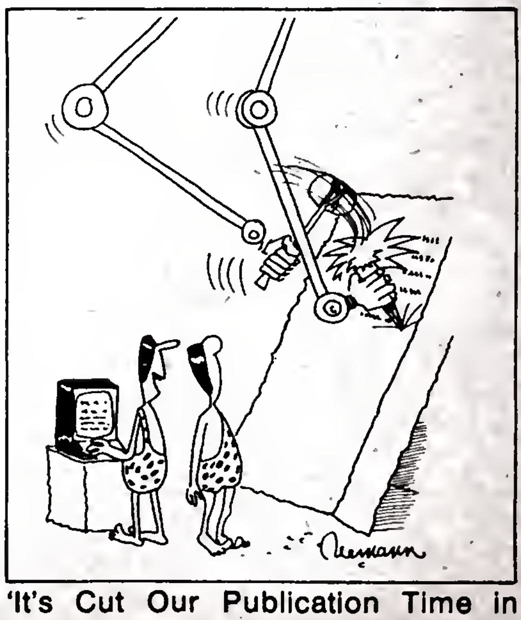
MDEC Forms Electronics Arm

ST. CHARLES, Mo. — McDonnell Douglas Electronics Co. (MDEC) has announced the formation of a division to consolidate its activities in the field of voice and data communications.

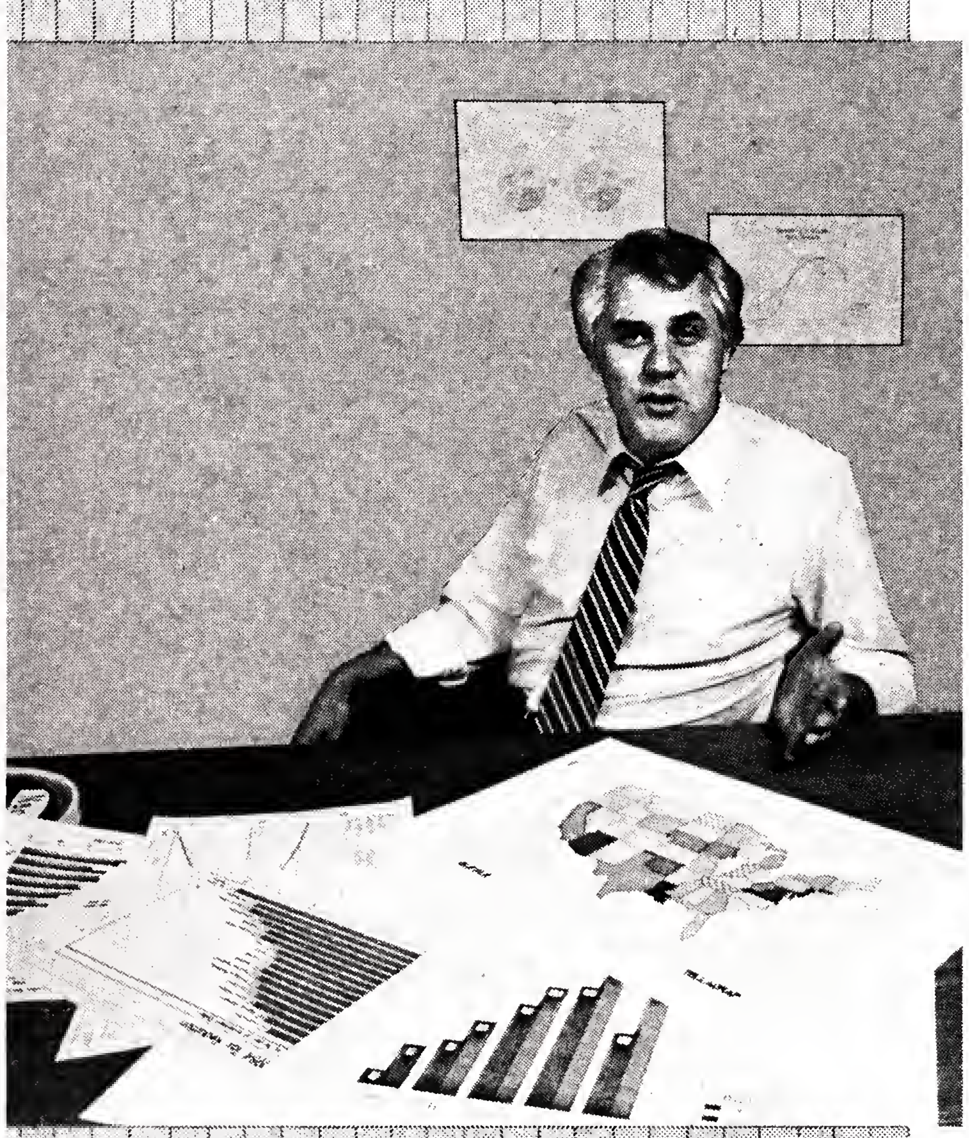
The Information Systems Division will be headed by Anatole Browde as vice-president and general manager. "The new division will build on our existing products in the telecommunications field to serve new markets emerging as a result of recent Federal Communications Commission regulatory actions," stated David C. Arnold, company president.

McDonnell Douglas Electronics currently manufactures a number of telecommunications devices under the trade name "Mavis."

Browde joined the corporation in 1959 as a manager in advanced electronic systems and was promoted to vice-president for engineering at Mdec in 1969. His most recent assignment has been as Mdec's vice-president for engineering and marketing.



'It's Cut Our Publication Time in Half.'



See us at
NCC Booth #2513

"I just installed the most flexible graphics software available..."

"It sure paid off."

A revolution was taking place. We learned computer graphics dramatically improved the decision-making process. Graphics software with "FLEXIBILITY" was the only way to make it happen. We already had some basic graphic software. It was hard to maintain and not adequate for our needs. Our users were demanding more productive and higher quality tools.

After installing DISSPLA® and TELL-A-GRAF®, ISSCO trained our users so that we were discovering profitable new applications immediately. Before ISSCO left our center, all of our output devices were interfaced. Field-proven code, maintenance, support, and ISSCO's 11 years of experience—for me it really paid off.

TELL-A-GRAF's® English-like commands made graphical representations of the information in our data bases simple and easy to access. We now can produce a graph with only one command and as needs dictate we can easily adjust any aspect of our graphics to enhance understanding. Both our highly demanding computer specialists and our secretaries easily learn to chart or graph the masses of data already in our computers. ISSCO GRAPHICS imbedded in existing applications programs has become very popular.

For us, installation of DISSPLA® and TELL-A-GRAF® was the right decision.

ISSCO GRAPHICS run on **IBM, DEC, CDC, CYBER, CRAY, BURROUGHS, PRIME, UNIVAC,** and **HONEYWELL.**

Call or write now for more free information.
714/452-0170
4186 Sorrento Valley Blvd., San Diego, CA 92121

ISSCO GRAPHICS
DISSPLA® · ODYSSEY · TELLAGRAF®

Tell me more about ISSCO GRAPHICS X
Name ________
Title ________ **Phone** ________
Company ________
Address ________
City ________ **St.** ________ **Zip** ________

"These Financial Reports Are All The Proof I Need.

Get Software International Back Here.

Today!"

Call Or Write Today.

Software International has sold more General Ledger systems than all of its major competitors combined.

SOFTWARE INTERNATIONAL®

Elm Square, Andover, MA 01810 (617)475-5040

The World Leader in Financial Management Software

General Ledger and Financial Reporting Accounts Receivable Accounts Payable Payroll/Personnel Human Resources Fixed Asset Accounting Work Order Management

Atlanta (404) 955-3705
Boston (617) 729-8962
Chicago (312) 298-3500
Columbus, OH (614) 773-2167
Dallas (214) 960-0220
Denver (303) 696-8591
Houston (713) 444-3348
Los Angeles (213) 573-0402
New York (914) 253-8050
San Jose (408) 292-9700
Montreal (514) 866-5728
Toronto (416) 924-1461
Vancouver (604) 669-6122

International Representatives In: Australia, Brazil, Colombia, Finland, France, Hong Kong, Israel, Italy, Malaysia, Mexico, Netherlands, New Zealand, Norway, Saudi Arabia, Singapore, South Africa, Sweden, United Kingdom

Conference to Feature Teletel Demonstration

ARLINGTON, Va. — Roy Bright, former head of the British Post Office's Prestel viewdata service and now managing director of the French service Intelmatique, will present the French Teletel videotex system at Information Gatekeepers, Inc.'s Viewtext '81 conference, slated for April 23-24 at the Sheraton Hotel here.

The conference will feature presentations of the world's major videotex operating systems, according to the organizers.

Speakers Robert Luff of Columbia Cablevision and William Lucas of Source Telecomputing will discuss the standards and policy questions that are involved in videotex operations.

Gene Mater of CBS will discuss the current experiment his company is carrying out in Los Angeles with the Antiope teletext system.

Martin Nisenholtz of New York University's Alternate Media Center will talk about the teletext trial WETA-TV is undertaking in Washington, D.C.

Registration for the two-day conference is $395 or $250 for one day. More information is available from Steve Weissman, Conference Coordinator, Information Gatekeepers, Inc., 167 Corey Road, Brookline, Mass. 02146.

Software Cost Estimating Topic of DPMA Seminar

LOS ANGELES — "Software Cost Estimating" is a two-day seminar sponsored by the Data Processing Management Association (DPMA) to be presented by Lawrence H. Putnam, president of Quantitative Software Management, Inc., in Boston on April 20-21; Palm Beach, Fla., April 23-24; and Williamsburg, Va., April 27-28.

The seminar covers such topics as the approaches to software cost estimating, the software life cycle, controlling the software house and the macro estimating approach.

Registration is $405 for DPMA members and $425 for nonmembers with a reduced rate of $360 for government, university personnel or teams of three or more from the same company. More information is available from DPMA, Education Foundation, P.O. Box 91295, Department SCE, Los Angeles, Calif. 90009.

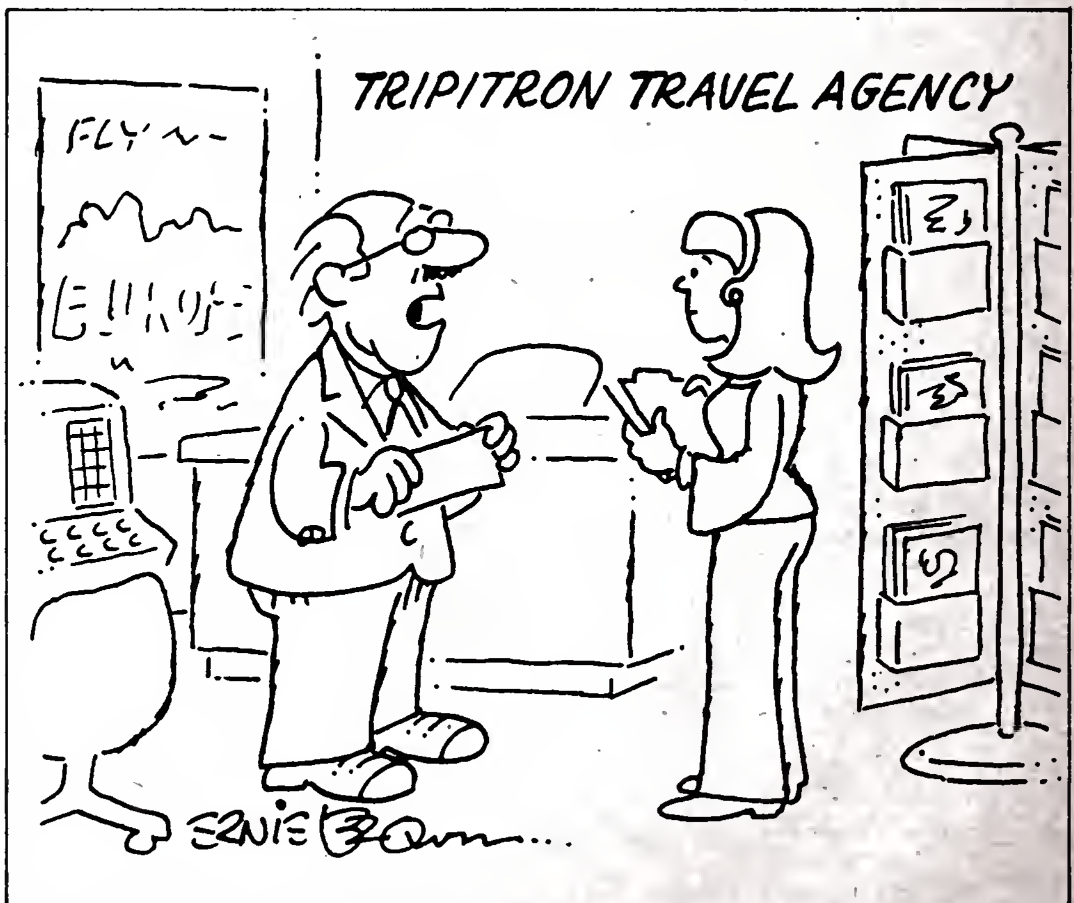
MIT Session June 22-26 to Cover 'Management in Information Era'

CAMBRIDGE, Mass. — "Current Issues in Information Systems: Managing in the Information Era" is the title of the sixth annual summer session slated for June 22-26 here by MIT's Center for Information Systems Research (CISR).

Methods and research aimed at improving the effectiveness of information processing tools and techniques will be the focus of the program. It is recommended for managers involved in the design, implementation and evaluation of information systems application.

Cost of the course, which includes lunches, a welcoming cocktail party and a conference dinner, is $1,250, CISR said.

Additional information is available from the Center for Information Systems Research at MIT, Sloan School of Management, 50 Memorial Drive, Cambridge, Mass. 02139.



'The Teleticketer Is on the Blink. These Printouts Are for the Crosstown Bus!'

Boole & Babbage Educational Services
announces the
CAPACITY MANAGEMENT FORUM

THE PERFORMANCE PEOPLE SHOW YOU
HOW TO IMPROVE *YOUR* PERFORMANCE

Boole & Babbage, long a leader in performance measurement and analysis, has designed a seminar to help data processing professionals improve their *own* performance.

Combining the best of traditional management principles with the latest capacity measurement techniques, the Boole & Babbage CAPACITY MANAGEMENT FORUM presents a practical and timely approach to effective data center management:

- Translating your *organization's needs* to *systems requirements* and back to respective *levels of service*
- Providing the means of identifying and translating *maximum operational efficiencies* in trade for *minimum bottom-line costs* to management
- Identifying the means to develop a strategy for the *full integration of the DP function* into the *corporate structure*

CHICAGO, MAY 18-19
DALLAS, JUNE 15-16
NEW YORK, JUNE 1-2
LOS ANGELES, JUNE 24-25

WHO SHOULD ATTEND: This forum is designed for the EDP Director/Manager and staff who maintain responsibility for the management and planning of current and future data center operations.

COURSE FEE: The $495 registration fee includes: the forum, forum kit, participant's guide and all lunches. Discounts are available for multiple registrations from one company.

REGISTRATION: Call Dr. Allen toll free (800) 538-1872. In California, call (408) 735-9550.

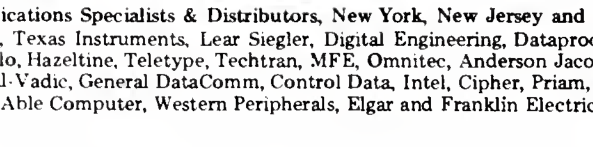
Boole & Babbage, Inc.
510 Oakmead Parkway
Sunnyvale CA 94086

LA34 DECwriter IV... ~~$995~~ $845.
MTI's present to you on our 13th birthday.
$150 off our low price during our birthday month.

Thanks to our customers, MTI is celebrating its 13th birthday this April. And we want to show our appreciation. That's why we are offering the DECwriter IV at this incredibly low price. This 300 baud desk-top teleprinter is ideal for the office environment and is loaded with features. In addition to a full ASCII keyboard, the LA34 offers adjustable vertical spacing from 6 to 12 lines per inch and variable character widths from 10 to 16.5 cpi. That means you can print a 132 column line on standard 8½ x 11 paper, and file printouts in standard filing cabinets.

Even when we're not having a birthday sale, our lease and purchase prices are hard to beat. MTI is the one source for all the terminals, peripherals, applications expertise and service you'll ever need for your communications network. Call MTI today.

New York: 516/482-3500, 212/895-7177, 518/449-5959
Outside N.Y.S.: 800/645-8016
New Jersey: 201/227-5552
Ohio: 216/464-6688



Applications Specialists & Distributors, New York, New Jersey and Ohio.
DEC, Texas Instruments, Lear Siegler, Digital Engineering, Dataproducts, Diablo, Hazeltine, Teletype, Techtran, MFE, Omnitec, Anderson Jacobson, Racal-Vadic, General DataComm, Control Data, Intel, Cipher, Priam, SMS, Able Computer, Western Peripherals, Elgar and Franklin Electric.

COMPUTERWORLD

. . . the one weekly newspaper that's designed to fulfill your unique "need to know". . . the one newspaper that can give you all the current information you need to benefit you, your organization and your career progress . . . 52 weeks of incisive news, commentary and special reports . . . subscribe today, use the attached postage paid order form.

☐ **Please enter my subscription**
(details on back)

☐ **I'm already a subscriber, but I'd like you to change my:**
- ☐ address
- ☐ title
- ☐ industry
- ☐ other

My current mailing label is attached and I've filled in new information on the other side

Put old label or label information here

Please send me COMPUTERWORLD for one year. RATES: United States — $36 Canada, Central & South America — $65 Europe and Near East — $125 Other Foreign — $175 (Airmail Service)

☐ Check Enclosed
☐ Am Ex ☐ BA/Visa ☐ MC (MC Only - List four digits above your name)

If charge we must have cardholder's signature: __________ Expiration Date: __________

First Initial
Middle Initial
Surname
Your Title
Company Name
Mail To:
City
State
Zip Code

Address shown is:
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld.*

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

BUSINESS/INDUSTRY
10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government - Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other __________

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/ Administrative Service
22 Director/Manager/Supervisor DP/MIS Srvs
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other: __________

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

CIRCULATION DEPT. 375 Cochituate Road, Rte. 30, Framingham, MA 01701

Detach here, fold, and place in post-paid envelope attached through binding.

University's Users Offered Minicourse on DBMS

By Lois Paul
CW Staff

AUSTIN, Texas — The school that brought you System 2000 has developed a short academic course to train its end users how to use Intel Corp.'s data base management system (DBMS), according to Smoot Carl-Mitchell of the University of Texas here.

Addressing a session at the Association of System 2000 Users for Technical Exchange's (Astute) spring meeting here recently, Carl-Mitchell explained that the University of Texas was a testing ground for System 2000 and continues to get the DBMS license free from Intel.

The Computation Center at the university is devoted primarily to education, Carl-Mitchell said. Its goal is to educate its users regarding the best use of computer facilities. The end user is expected to become self-sufficient in the use of the computer and to require very little support from the center's technical staff.

Carl-Mitchell compared the academic computing environment to that of a service bureau. Both are fragmented and have many small users.

At the University of Texas, the number of existing data bases is probably in the hundreds, ranging from small tutorial systems to fairly large research and bibliographic systems, he said.

The center's user groups include the Public Utilities Commission (an external customer), the Bureau of Business Research, the Center for Energy Studies and the general libraries.

Major Goal

According to Carl-Mitchell, the short-course program has been a major goal of the Computation Center. He said a short course is a free two- to 12-hour tutorial on some aspect of the University of Texas computing system. For the past several years, part of this curriculum has been a short course on data base concepts and System 2000.

The System 2000 course is 12-hours long and extends over a two-week period. Its goal is to familiarize users with general DBMS concepts and System 2000 in particular, he said. The course combines lectures with audio-visual aids. The Computation Center provides a classroom equipped with an overhead projector for transparencies and a TV monitor for displaying information from a CRT terminal.

The instructor introduces the class to System 2000 by showing a data base definition and data loading sequence. Using simple data retrieval examples, the instructor shows the class how the DBMS works operationally on the computer system.

According to Carl-Mitchell, "hands-on" experience is encouraged. The computer industry is a field where doing is the best method of learning, he said.

Class participants are given an overview of general data base concepts, including schema and occurrence structure concepts and the facilities provided by a general-purpose DBMS. Also presented is the hierarchical data model used by System 2000 and its accompanying terminology, he said.

Basic Understanding

The rest of the course covers the access facilities of System 2000, using a tutorial data base definition to relate the example queries to the data base, Carl-Mitchell said.

By the end of the course, he added, the students should have a basic understanding of DBMS concepts and System 2000.

He noted that the tutorial data base is kept on the system for the students' use, even after the short course has ended. They can continue to run example queries to learn more of the system's capabilities.

According to Carl-Mitchell, a major difficulty for the Computation Center is that it is not commissioned to provide continuing support to applications of any kind. The center provides consulting services to answer questions users might have or to correct system bugs.

However, long-range, day-to-day support is not offered, Carl-Mitchell explained.

The short courses are an educational tool to acquaint the University of Texas computer system users with the facilities offered by the Computation Center.

The user groups themselves must provide long-range support, Carl-Mitchell said.

Carnegie Press Offers Courses On Office Gear

MADISON, N.J. — Carnegie Press has organized a series of two-day seminars to be held in Washington, D.C., Houston, Newport Beach, Calif., and Philadelphia titled "The Automated Office Administration Seminars," which it said was designed to give fundamental knowledge of automated office equipment, systems integration and documentation techniques.

The seminars have been planned to give office managers, administrators, word processing personnel, systems analysts and technical writers the ability to effectively document the entire system, according to a Carnegie Press spokesman.

Manuel de Encio Jr., president of the consulting firm of Encio Enterprises, Inc. and author of several computer-based systems used for the creation, maintenance and production of manuals and support documents, will be the course director and seminar leader.

Registration costs $545 for two days. Sessions start May 26-27 in Washington, D.C.; May 28-29 in Houston; June 1-2 in Newport Beach, Calif.; and June 4-6 in Philadelphia, Carnegie Press said.

Further information is available from Registrar, Carnegie Press, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

The New Standard For PDP-11 Disk System Technology

Check with us before you buy, because we can beat all prices!

Know All the Hidden Costs

Only System Designed Just for PDP-11 Family
Designed exclusively for DEC's UNIBUS or MASSBUS CPU's. On the UNIBUS, it's just one card that plugs into any spare SPC slot. On the MASSBUS, four cards plug into any spare existing RH70 standard back plane.

Same Disk Drive as DEC RM02-03, RP06 and RM04-05
We use the same disk manufacturers as does DEC. The RM02-03 is the 9762 CDC 80MB and the new RM04-05 300MB is the CDC 9766. Only the LOGO is different.

Transparent to All DEC Software, Diagnostics and Drivers
You bet! Use your existing Software . . . no change needed. Runs all DEC's Diagnostics plus has its own. Fully emulates DEC disk Drivers.

Worldwide Installation and Maintenance
Through Data Systems Services, maintenance and installation is provided via CDC for both Drive and Controller. We also offer full PDP-11 system support.

Full Media Compatible?
That's right! You can read or write on our drives. Put it on DEC's and it will play or vice versa. TRULY MEDIA COMPATIBLE.

DRM02-3 80MB Slave
DRJM02 80MB + Controller
DRWM03 80MB + Controller
DRJM04-5 300MB Slave
DRJM04 300MB + Controller
DRWM05 300MB + Controller
RJM07 600MB + Controller
RWM07 600MB + Controller
RM07 600MB Slave
DRP06 200MB Slave
DRWP06 200MB + Controller
DTU45
DTU77
DTU125
Line Printers
Memories
11/34 → 11/70, VAX
Systems

OEM Discounts Available

(714) 770-8024

23901 Remme Ridge Rd.
El Toro, CA 92630

DATA SYSTEMS SERVICES

PDP and DEC are registered trademarks of Digital Equipment Corporation

For Annual Return of $5.2 Million

Chicken-Seller Puts Eggs in Forecasting Basket

SAN ANTONIO, Texas — Current soaring interest rates make short-term investing lucrative. That's why Church's Fried Chicken Restaurant chain here has designed a computerized system to forecast each restaurant's daily revenues and to prepare bank drafts accordingly. The drafts are then deposited into the company's bank account, where they are immediately available for investing.

"We are right more than we are wrong. I'd say we use overdraft facilities 10% of the time," said William Storm, senior vice-president of finance at Church's.

Storm said the company had about $30 million invested at 14% interest, with an investment return of about $5.2 million projected for the year.

Church's system was designed around an IBM 370/148 mainframe that has just been upgraded to an IBM 4341. Cash managers study the sales histories of more than 1,000 restaurants in the chain and project what the next week's deposits will be.

From this information, Storm said, the deposit transfer drafts are produced and sent to the bank for daily processing.

Restaurant managers themselves send in the actual receipt information to Church's headquarters using an Emtrex 380 mainframe that interfaces with the IBM 4341. This information is used to forecast the next week's receipts.

Daily Cycle

"Basically, you are taking in information and money on almost a daily cycle. Otherwise, you would have it every 30 days or when you get your bank statements," Storm said.

Using its current system, Church's has made available more money for investment rather than having that resource lie idle waiting to be deposited at the end of the month or week.

The model was devised by Church's DP Department about four years ago. It is currently updated every six months.

Storm said that within six months, Church's is planning to install a new system with point-of-sale machines in every restaurant. In that way, the firm hopes to be able to know, rather than predict, each restaurant's balance at the end of the day.

The system will be built and designed by Church's using operating software written for the IBM 4341 system.

May Meet Set On Productivity

PALO ALTO, Calif. — How to measure and increase managerial productivity will be the subject of a two-day seminar here next month sponsored by Palo Alto Technology Transfer.

The "Communication for Action" seminar will offer a perspective on managerial work stations, local-area networks, electronic filing systems, electronic mail and voice input/output, the company said.

In addition, the seminar will feature a team of several leaders in the areas of managerial communications, decision support systems and natural languages.

Managerial work will be analyzed to show why current approaches to improving managerial productivity do not work and how the "coordinator" structure helps both to improve and to measure that productivity, the company claimed,

The seminar, which will also be held in San Francisco on May 7 and 8, costs $595. More information is available from Palo Alto Technology Transfer, 486 Fulton St., Palo Alto, Calif. 94301.

MIT Session Starts June 22

CAMBRIDGE, Mass. — MIT's Center for Information Systems Research (CISR) has announced its sixth annual Summer Session, "Current Issues in Information Systems: Managing in the Information Era," slated for June 22-26 at the Hyatt Regency here.

Topics for the general sessions at the conference, which will be given by CISR faculty, will include support sysems, data base management technology, microprocessor systems and the management of office automation.

The central theme of the seminar will focus on research and practice aimed at improving the effectiveness of information processing tools and techniques in different types of organizational settings.

Tuition, which includes luncheons and a welcoming cocktail party and conference dinner, is $1,250, CISR said.

Those wishing more information on the summer session can contact Judith A. Quillard, CISR, MIT, Alfred P. Sloan School of Management, 50 Memorial Drive, Cambridge, Mass. 02139.

Who will be first to see into the depths of space?

It could be you and Hughes Electro-Optical and Data Systems.

We built the first long wavelength infrared sensor ever launched into space, and a cryogenic rocket-borne infrared telescope that's sighted hundreds of new celestial objects. Looking earthward, also, our scanners map the globe every eighteen days. In fact, we're making a wide range of electro-optics, fiber-optics, thermal imaging and infrared systems that are like second sight on earth for mankind's benefit and the defense of the nation.

Today, Hughes is one of the nation's largest employers in virtually every engineering, scientific, computer and technical discipline — with 1,500 projects and a $5 billion backlog. Yet we're decentralized to give you the kind of environments that stimulate innovation and individual recognition.

And our new facility in El Segundo will be a 140-acre city of research and development, manufacturing and testing excellence, to help thrust your vision into the future.

Who will be first with the optical and data systems of the future? It could be you and Hughes.

At Hughes Electro-Optical and Data Systems, we'll introduce you to people, ideas and jobs that could change your world. And maybe ours.

Call or send resume to:

Hughes Electro-Optical
& Data Systems
P.O. Box 913, Dept. WC-4C
El Segundo, CA 90245
(213) 616-3374

Current openings:

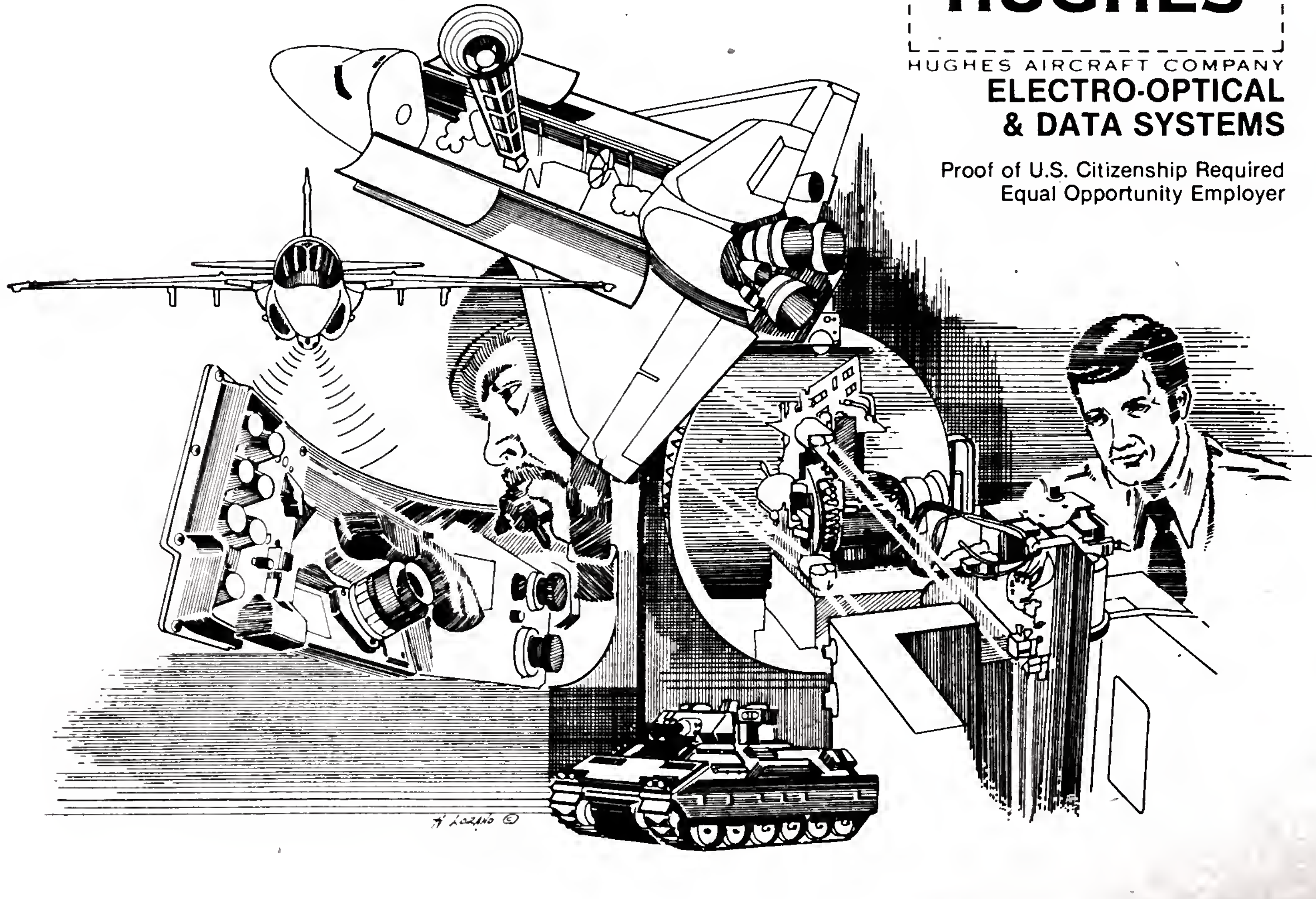
Electro-Optical/Optical Design
Infrared Systems
Materials & Processes
Metallurgical
Computer Science/Software
CAD/CAM/CAT
Analog/Digital Design
Components & Materials
Control Systems Design/Analysis
Cryogenic
Electromechanical Packaging
Servo
Space Sensors
Facilities
Test Equipment Design

It could be you and Hughes **Electro-Optical and Data Systems.**

HUGHES

HUGHES AIRCRAFT COMPANY
ELECTRO-OPTICAL & DATA SYSTEMS

Proof of U.S. Citizenship Required
Equal Opportunity Employer



IEEE Honors Inventor of Darlington Transistor

NEW YORK — Dr. Sidney Darlington, inventor of the Darlington transistor pair and the first transistor operational amplifier, was awarded the Institute of Electrical and Electronic Engineers, Inc.'s (IEEE) Medal of Honor for his contributions in the field of communication engineering.

Darlington, a retired Bell Laboratories engineer, received the gold medal award, an inscribed certificate and a check for $10,000 at an awards reception here last week.

In 1947, Darlington invented the 'chirp' pulse-compression radar technique, which has been used by the U.S. military since the late 1950s. He takes his place in a line of distinguished inventors, like Guglielmo Marconi, Lee de Forest and Robert N. Noyce, who have received the IEEE award since it was first presented in 1893.

Others Honored

Eleven other electrical and electronics engineers who have contributed significantly to their fields were also honored at the reception.

Dr. David Slepian, of Bell Laboratories' Mathematics Research Center staff, received the Alexander Graham Bell Medal for fundamental contributions to communications theory.

C. Chapin Cutler, professor of applied physics at Stanford University, received the Edison Medal for creative contributions to microwave electronics, space communications and technology of communications systems.

Dr. James Hillier, retired executive vice-president and senior scientist at the David Sarnoff Research Center, received the Founders Medal for contributions to electron microscopy.

George B. Litchford, president of Litchford Electronics, Inc., received the Lamme Medal for contributions in the development of air navigation and air traffic control electronic systems.

Dr. Ernest S. Kuh, professor in the Department of Electrical Engineering and Computer Sciences at the University of California at Berkeley, received the IEEE Education Medal for contributions to teaching in the engineering profession.

Robert H. Tanner, a consulting engineer and former president of the IEEE, received an IEEE Service Award.

Five engineers also received Prize Paper Awards for works published. Those who received the awards were Timothy C. May and Murry H. Woods of Intel Corp.; Whitfield Diffie of Secure Systems Research, BNR, Inc.; Martin E. Hellman, professor of electrical engineering at Stanford University; and Lawrence H. Goldstein, senior computer-aided design engineer at Inmos Corp.

Quality Assurance Focus of Sessions Slated for May

FRAMINGHAM, Mass. — MIS Associates has announced a symposium and two seminars to be held this spring for quality assurance and system design personnel.

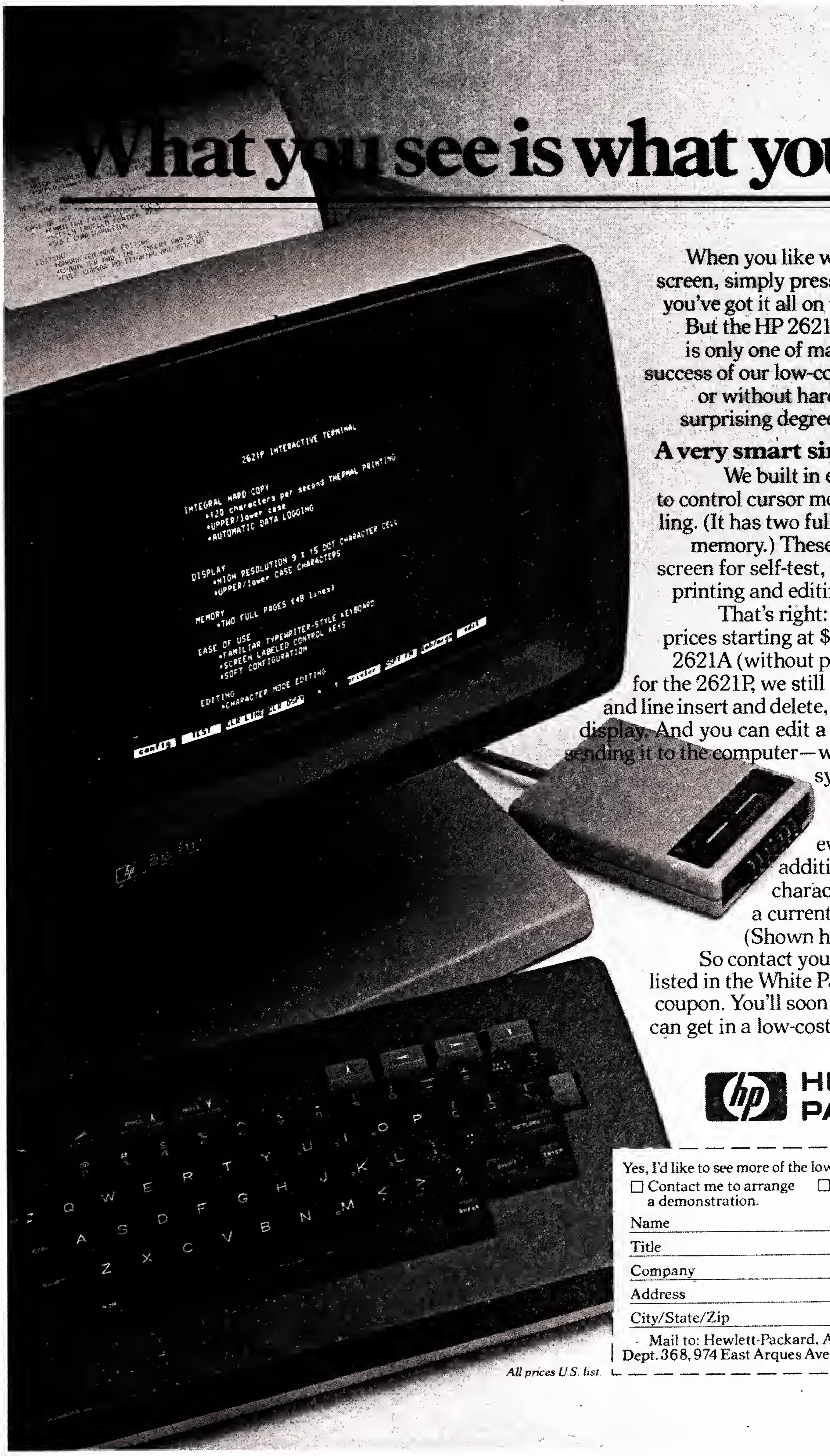
"Quality Assurance in DP — A Symposium" is slated for April 20-22 in Portchester, N.Y. The symposium costs $450.

"Effective Quality Assurance for DP" and "Designing Internal Controls in Computerized Systems" are offered in Houston on April 29-May 1 and in Chicago on May 6-8. The seminars cost $495.

More information is available from MIS Associates, 12 Juniper Lane, Framingham, Mass. 01701.

CICS COURSE
HANDS-ON COMMAND LEVEL
held in New York City,
the start of each month.
CICS INTERNALS COURSES
and **IN-HOUSE COURSES**
also available.

VERHOEF INF.
PACKAGES, INC.
28 Hathaway Lane
Essex Fells
N.J. 07021
U.S.A.
(201)
228-0114


2621P INTERACTIVE TERMINAL
INTEGRAL HARD COPY
•120 characters per second THERMAL PRINTING
•UPPER/lower case
•AUTOMATIC DATA LOGGING
DISPLAY
•HIGH RESOLUTION 9 x 15 DOT CHARACTER CELL
•UPPER/lower CASE CHARACTERS
MEMORY
•TWO FULL PAGES (48 lines)
EASE OF USE
•FAMILIAR TYPEWRITER-STYLE KEYBOARD
•SCREEN LABELED CONTROL KEYS
•SOFT CONFIGURATION
EDITING
•CHARACTER MODE EDITING
config
TEST
CLR LINE
CLR DSPY
printer
edit

What you see is what you get.

When you like what you see on the screen, simply press a key and presto! you've got it all on paper.

But the HP 2621P's built-in printer is only one of many reasons for the success of our low-cost terminals. With or without hard copy, they offer a surprising degree of sophistication.

A very smart simple terminal.

We built in eight function keys to control cursor movement and scrolling. (It has two full pages of scrolling memory.) These are labeled on the screen for self-test, soft configuration, printing and editing.

That's right: editing. Even with prices starting at $1,495 for the basic 2621A (without printer) and $2,650 for the 2621P, we still included character and line insert and delete, clear line and clear display. And you can edit a line of data before sending it to the computer—without writing any system software.

Recently, we've made a good thing even better with the addition of international character set options and a current loop interface. (Shown here.)

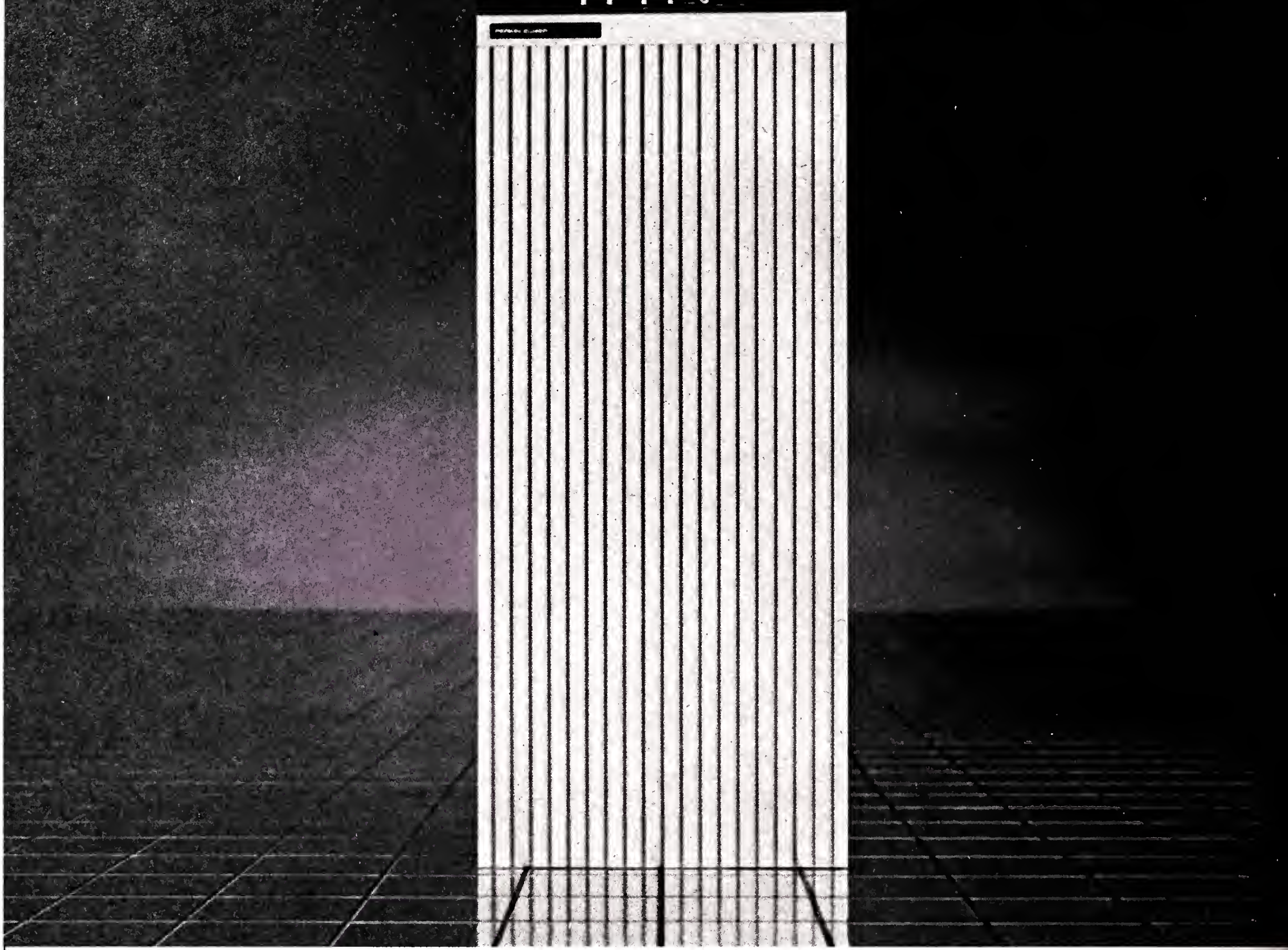
So contact your nearest HP office listed in the White Pages or send us the coupon. You'll soon see how much you can get in a low-cost terminal.

HEWLETT PACKARD

All prices U.S. list.

Yes, I'd like to see more of the low-cost HP 2621 terminal.
☐ Contact me to arrange a demonstration. ☐ Send literature.
CW 4-20
Name
Title Phone
Company
Address
City/State/Zip
Mail to: Hewlett-Packard, Attn: Tom Anderson
Dept. 368, 974 East Arques Ave., Sunnyvale, CA 94086
42001 HP1.6

The new Perkin-Elmer Megamini® 3230– the 32-bit price/performance leader.



Our new 3230 is powerful enough to outperform anything in its class, flexible enough to grow to 8MB. And we're throwing down the gauntlet to anyone who thinks his 32-bit mini can beat benchmarks like those above.

Here's what you'll be going against.

☐ Up to 8MB of directly addressable high-density MOS ECC memory.

☐ 340 nanoseconds memory access time with cache memory standard.

☐ A Floating Point Processor with unsurpassed accuracy.

☐ The ability to support more than 1,000 devices on its multiplexor bus.

☐ Power to support 8 DMA ports, each serving 16 controllers with aggregate throughput of 8MB per second.

☐ Up to 115 gigabytes of on-line disc storage.

☐ 2,048 32-bit words of Writable Control Store with full software support.

☐ The industry-leading globally optimizing FORTRAN VII.

☐ Reliance, high-performance software package for commercial transaction processing.

☐ Many more standard and optional features that are available now—not a year from now.

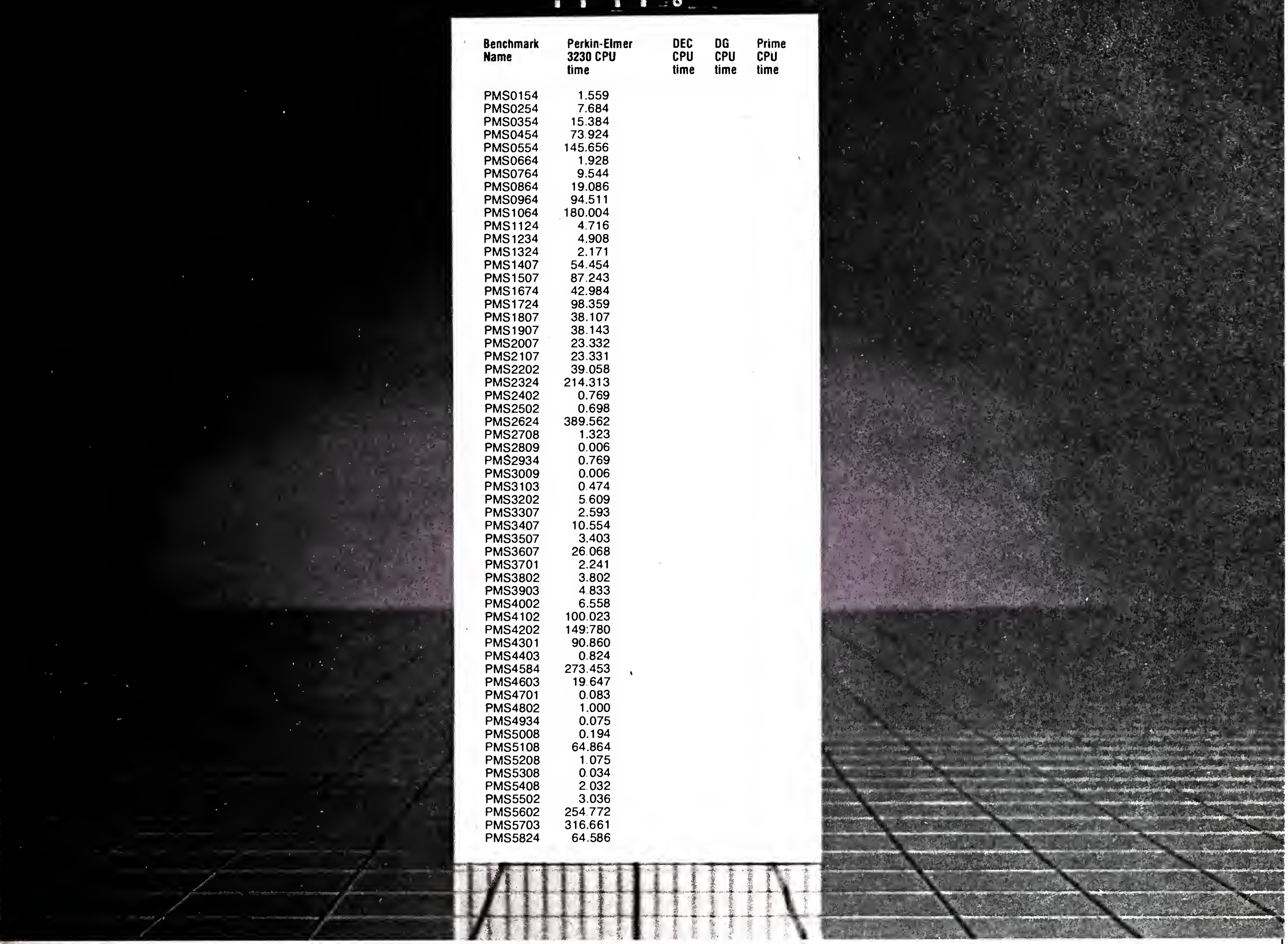
Powerful Megaware™ software.

The Perkin-Elmer 3230 comes with a wide repertoire of field-proven Megaware system software.

Our Fortran VII development compiler produces object modules at a speed of 2,000 lines per minute. And our Multi-Terminal Monitor lets you have 64 programmers working interactively in any mix of these languages —FORTRAN, COBOL, Pascal, CAL

Meet the new champ at the NCC Show Booth 726.

We challenge any machine to beat the 3230 dollar for dollar, benchmark to benchmark.



Benchmark Name	Perkin-Elmer 3230 CPU time	DEC CPU time	DG CPU time	Prime CPU time
PMS0154	1.559			
PMS0254	7.684			
PMS0354	15.384			
PMS0454	73.924			
PMS0554	145.656			
PMS0664	1.928			
PMS0764	9.544			
PMS0864	19.086			
PMS0964	94.511			
PMS1064	180.004			
PMS1124	4.716			
PMS1234	4.908			
PMS1324	2.171			
PMS1407	54.454			
PMS1507	87.243			
PMS1674	42.984			
PMS1724	98.359			
PMS1807	38.107			
PMS1907	38.143			
PMS2007	23.332			
PMS2107	23.331			
PMS2202	39.058			
PMS2324	214.313			
PMS2402	0.769			
PMS2502	0.698			
PMS2624	389.562			
PMS2708	1.323			
PMS2809	0.006			
PMS2934	0.769			
PMS3009	0.006			
PMS3103	0.474			
PMS3202	5.609			
PMS3307	2.593			
PMS3407	10.554			
PMS3507	3.403			
PMS3607	26.068			
PMS3701	2.241			
PMS3802	3.802			
PMS3903	4.833			
PMS4002	6.558			
PMS4102	100.023			
PMS4202	149.780			
PMS4301	90.860			
PMS4403	0.824			
PMS4584	273.453			
PMS4603	19.647			
PMS4701	0.083			
PMS4802	1.000			
PMS4934	0.075			
PMS5008	0.194			
PMS5108	64.864			
PMS5208	1.075			
PMS5308	0.034			
PMS5408	2.032			
PMS5502	3.036			
PMS5602	254.772			
PMS5703	316.661			
PMS5824	64.586			

Megamini is a registered trademark of The Perkin-Elmer Corporation.

MACRO, BASIC II, Coral 66 or RPG II.

Reliance, our commercial transaction processing software, gives you less than two-second response on up to 128 terminals. Reliance makes operations and program development easy with its query facility, interactive screen forms design and ANSI-standard COBOL.

The price/performance challenge.
The benchmarks shown are from a suite of 58 supplied by customers. They reflect the same kind of power-hungry applications you face every day.

We challenge anybody to deliver performance like this at anything near the price of the Perkin-Elmer 3230. System prices begin under $100,000 (U.S.) with delivery in 60 days.

Check out the champion.
If challenging applications are making you hungry for power, let us show you how the 3230 would handle them. Send us a set of benchmarks which typify your jobs and we'll run them on our 3230. We're confident the results will run your present system out of town.

Send in the coupon for complete information on the Megamini 3230.

The Perkin-Elmer Corporation CW 42081
Marketing Communications
2 Crescent Place, Oceanport, NJ 07757
Please send me complete information ☐ on the 3230
☐ on how to have my benchmarks run
☐ Have a salesperson call.
Name ____________
Title ____________
Company ____________
Street ____________
City ____________
State ____________ Zip ____________
Tel. ____________

Call toll free: (800) 631-2154
In NJ: (201) 870-4712

PERKIN-ELMER

NonStop™ Network

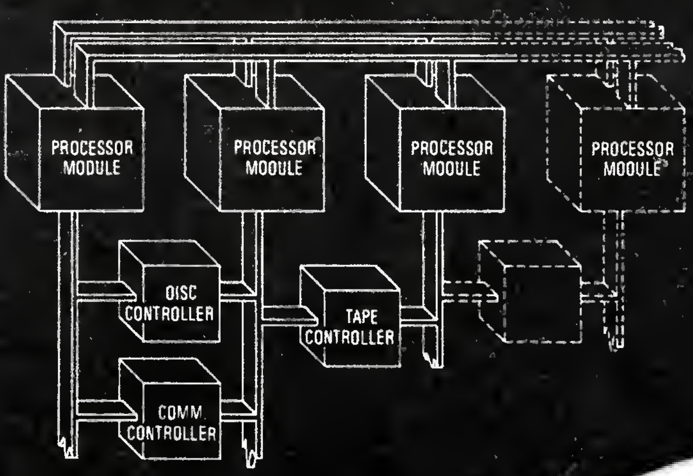
8 Unique network system architecture of a series

The goal: NonStop™ operation in an on-line network.

The network must be able to handle the loss of any critical element without loss or duplication of any transaction in progress and without damage to the data base. Applications must be able to run anywhere and access devices and files anywhere in the system without having specific knowledge of physical location. In fact, the entire network must look like a local resource to every user. This requires complete geographic independence.

The solution: build on the right foundation. Every Tandem system is effectively a local network comprising two or more processors.

So even the minimum system is already a complete, true distributed processing NonStop™ network. A unique message system at the heart of every system controls communications among processors. Networking software simply increases the scope, to allow communications among as many as 255 separate Tandem systems— each ranging in size from two to sixteen processors. To the user, Tandem's network, EXPAND, appears as a single set of computer resources rather than a collection of individual systems.



The result is something totally new in on-line transaction oriented systems: the ability to deal with a remote program, a remote processor, a remote terminal, even remote data as if it were right at the users' fingertips.

Since programs can access devices and files anywhere in the system without having specific knowledge of physical location, the development of applications can be identical for single or multiple system environments. A request for information may originate from any node and that same request can be run on any other system in the network without the need to modify it in any way. And it is incredibly easy to learn. Since the network uses the same inputs and procedures as the minimum individual system, there is no need for special training manuals, classes and the uncertainty which accompanies other systems when updating from a single system to a network operation.

The EXPAND network gives users the flexibility to build a network that supports their business and not have to shape their business to the network. Users can place exactly the right amount of computing power at each site.

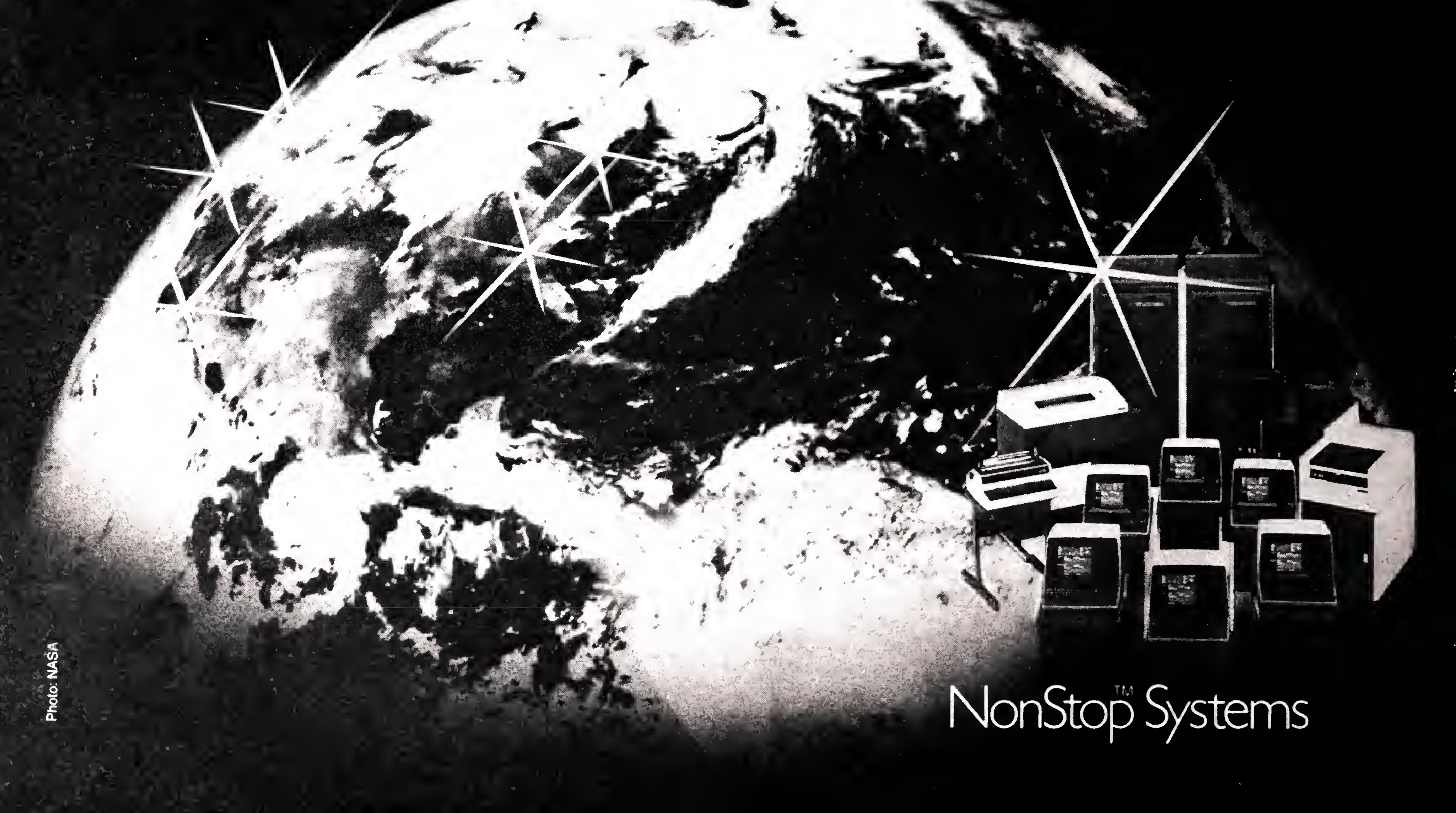
As computing requirements grow, they can add memory, processors or peripheral devices to any site and still retain total compatibility of operating system, data and applications programs.

In fact, nodes consisting of 2 to 16 processors can be added or removed and communications paths altered, all without recompiling or changing a single line of code in existing application programs.

Another reason Tandem is a whole generation ahead. Call or write for complete information. Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014 USA. **TOLL FREE: 800-538-3107 or (408) 725-6000 in California.**

TANDEM

A whole generation ahead



NonStop™ Systems

Photo: NASA

Calendar

May 20-22, San Antonio, Texas — **Federation of Government Information Processing Councils Seminar and Equipment Expo.** Contact: FGIPC, Registration Chairman, P.O. Box 5213, Kansas City, Mo.

May 21-22, New York — **Introduction to the Tools of Structured Design.** Contact: Yourdon, Inc., Suite 3830, 1133 Ave. of the Americas, New York, N.Y. 10036.

May 21-22, Houston — **IMS/VS Dump Reading.** Contact: Data Base Management, Inc., 281 Hartford Tnpk., Vernon, Conn. 06066.

May 21-22, New York — **Decision Support Systems.** Contact: CAIS Department, 700 Merrill Hall, 90 Trinity Place, New York, N.Y. 10006.

May 21-22, Washington, D.C. — **SAS Multivariate Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

May 21-23, New York — **1981 National TRS-80 Microcomputer Show.** Contact: Kengore Corp., 3001 Rt. 27, Franklin Park, N.J. 08823.

May 26-28, Boston — **Electronic Office '81.** Contact: Information Gatekeepers, Inc., 167 Corey Road, Brookline, Mass. 02146.

May 26-28, Hyannis, Mass. — **Telecommunications: Trends and Directions.** Contact: Electronic Industries Association, Communications Division, 2001 Eye St., N.W., Washington, D.C. 20006.

May 26-29, Seoul, Korea — **Office Korea '81.** Contact: Clapp & Poliak, International, 7315 Wisconsin Ave., Washington, D.C. 20014.

May 27-28, Salt Lake City, Utah — **Microcomputers for Managers.** Contact: Dr. Gary Carlson, International Seminars, Inc., P.O. Box 7029, University Station, Provo, Utah 84602.

May 27-28, Baltimore, Md. — **Risk Analysis for Automated Information Systems.** Joseph Nocerino, CRC Systems, Inc., 4020 Williamsburg Court, Fairfax, Va. 22032.

May 27-29, Boston — **Establishing the Word Processing Center.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020. Also being held May 27-29 in Chicago.

May 27-29, Atlanta — **Effective Computer Operations Management.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

May 27-29, Washington, D.C. — **DP Auditing and Control: An Introduction.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

May 27-29, Denver — **Distributed Systems: Effective Approaches and Applications.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

May 27-29, Washington, D.C. — **Information Systems Planning: A Structured Approach.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

May 27-29, Chicago — **Systems Analysis and Design: Concepts and Effective Practice.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

May 27-29, Washington, D.C. — **X.25 and Other Packet-Switching Protocols.** Contact: Technology Transfer Institute, P.O. Box 49765, Los Angeles, Calif. 90049.

May 27-29, Washington, D.C. — **Computer Communications Protocols.** Contact: Director, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

May 27-29, Boston — **Network Protocols in Data Communications.** Contact: American Institute for Professional Education, Carnegie Building, Madison, N.J. 07940.

May 28-29, Washington, D.C. — **Data Communications: Advanced Concepts and Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held May 28-29 in Dallas.

May 31-June 3, New Orleans — **1981 National Operations and Automation Conference.** Contact: Saundra Currence, Operations and Automation Division, The American Bankers Association, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

Chess Tourney Slated As Part of ACM Meet

LOS ANGELES — The 12th annual Association for Computing Machinery (ACM) North American Computer Chess Championship will be held here on Nov. 8-10 as part of the 1981 ACM Annual Conference.

A four-round tournament is planned. In addition, there will be a four-round blitz tournament where moves in this event will proceed at a rate of five seconds per move.

The championship organizers anticipate that the top five programs that competed in the world computer chess championship will participate. Mike Valvo, an International Master, will act as tournament director replacing David Levy who had filled that position for the past 10 years.

Anyone interested in entering a program or seeking more information should contact Prof. Monroe Newborn, School of Computer Science, McGill University, 805 Sherbrooke St. W., Montreal, Quebec, H3A 2K6. Deadline for entries is Sept. 10.

WE INSPECT ALL FOUR SIDES OF EVERY INCH OF EVERY TAPE WE SELL.

Ectype™ computer tape. A computer tape this good shouldn't need to be certified. But we do it anyway.

First, we inspect the sides to be sure there are no variances in width. If a tape's too wide or too narrow, tape-to-head contact suffers and you can lose data.

Then, to make sure every inch gives uniform output level, we electronically signal-test every inch of tape with test equipment settings consistent with the NBS master tape (SRM-3200). If we can't read back this signal within the test parameters, the tape's not certified.

And not for sale.

Ectype computer tape. First we make it better. Then we make sure it's better. Call 1-800-843-9862 (In Canada call 605-996-8200) for the name of your nearest distributor.

SYNCOM®
Your flexible alternative

©1981 Syncom, division Schwan's Sales Enterprises, Inc.
P.O. Box 130, Mitchell, SD 57301

See us in Booth 2010-2011 at the National Computer Conference

EDITORIAL

Why IRM?

Users should heed those advocating the information resources management (IRM) approach to managing information storage, processing and transfer.

With IRM, a corporate executive is charged with ensuring that people in an organization get the information they need to do their jobs responsibly, efficiently and effectively. DP and management information systems (MIS) managers would report to this IRM executive, who need not have a heavy background in computing [CW, April 13].

While DP and MIS professionals concentrate on systems efficiency, the IRM executive would concentrate on systems effectiveness. He would be sensitive to needs and desires for information throughout his organization and to how they affect policymaking, planning and relations with the outside world.

As speakers at Bentley College's recent Fourth National Business Ethics Conference pointed out, IRM is a way for businesses to keep the purpose of computing in perspective. Companies should implement systems to improve productivity and service to customers and — in many cases — to facilitate research and development or strategic planning.

DP/MIS staffs sometimes push hard for systems upgrades and modifications that would raise throughput and response times without improving quality of information or decisions based on information. The IRM executive can play the Devil's advocate, as one conference speaker put it, when proposals for systems expansion are made.

As the custodian of an organization's information assets, this executive could act to prevent development of inappropriate systems that would waste resources and create opportunities for abuse and violations of rights. Technical professionals often are blamed for such negative repercussions of inappropriate systems when they have, in fact, little control over the way systems are used or the process of interpreting systems-generated data to support decision-making.

IRM is well-placed at central headquarters as the organization decentralizes its DP operations. This approach can help top management keep the organization on target as decentralization changes procedures and control points.

IRM can also build dialogue between the end users, who have an important stake in the outcome of implementations, and technical specialists, who are the only people capable of grasping details of implementation.

Bentley College served the business and computing communities well with its recent conference. Perhaps the most significant theme voiced by participants was how urgent it is that developers of information systems come to understand the consequences of implementation.

This understanding is necessary for people to build systems consistent with values of a free and humane society.

DATA PAST

Five Years Ago
April 19, 1976

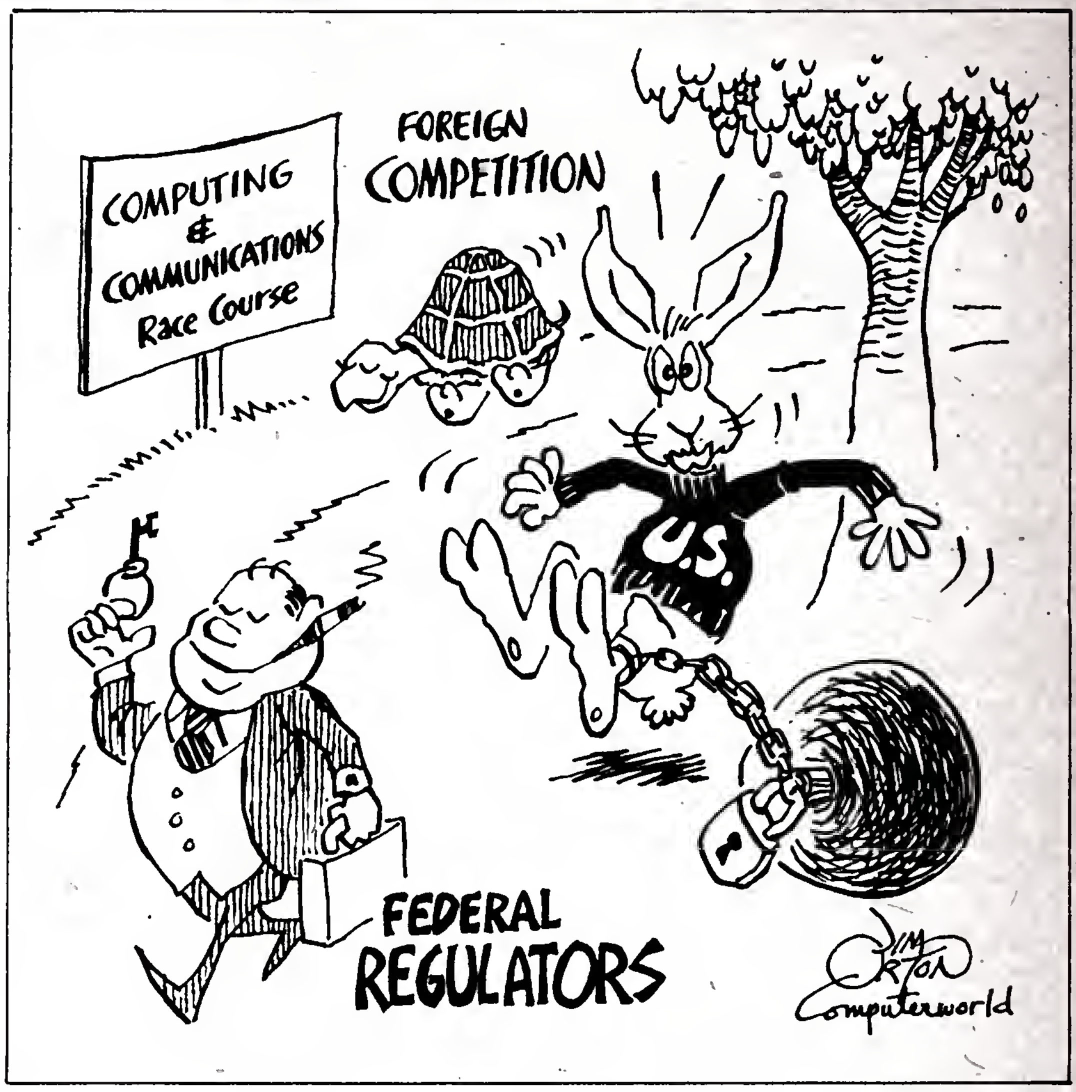
WASHINGTON, D.C. — "Any electronic funds transfer (EFT) system potentially represents a highly effective tool for keeping track of people and enforcing 'correct' behavior," particularly when operated by government agencies, the Office of Telecommunications Policy (OTP) charged here. Moves to "facilitate the placement of the Federal Reserve System at the heart" of a national EFT system were both "inappropriate and unwise," John Eger, acting director of OTP, said in a filing with the Federal Reserve Board.

Ten Years Ago
April 21, 1971

CANOGA PARK, Calif. — The National Association of IBM System/3 Users was formed independently of IBM to circulate information about the growing numbers of suppliers who were making competitive or unique equipment to be used with the system.

— — —

REDWOOD CITY, Calif. — Ampex Corp. unveiled the Terabit memory, which used videotape recording methods to allow on-line accessing of the equivalent of up to 32,000 tape reels.



The Handicapper

LETTERS

Budget Woes

Ray Michaels and Bob Kay of the Brooklyn District Attorney's Office have an open invitation to visit the Bronx County District Attorney's Office, where we have been using sophisticated computer technology for eight years. Our system performs case tracking, automatic generation of court documents and statistical analysis ["Brooklyn District Attorney's Office 'Doesn't Fool Around,' " [CW, March 30].

The district attorneys of the five boroughs in New York City are continually seeking ways to improve their capability to keep records, track cases and prepare documents. However, their efforts to improve are frequently blocked by budget administrators whose comprehension of automation seems to have stopped with the fountain pen.

The primitive level of understanding at the funding sources has been very destructive to the district attorneys' efforts to provide their assistant prosecutors with up-to-date case information. In addition, the same destructive forces have frustrated administrators of the district attorneys' offices in their attempts to obtain reliable management-type information.

Leroy A. Brown
Special Assistant
To the District Attorney
Bronx, N.Y.

Another Stumbling Block

Regarding *Computerworld's* March 30 special report on productivity and turnover:

One significant factor in high programmer turnover and low productivity which is frequently overlooked or underestimated is frustration. There are at least two major causes of frustration at my installation: technical or capacity problems and task allocation problems. Technical problems include frequent system crashes, slow TSO response time, once-a-day-or-less turnaround and lost output and jobs.

The theory is that batch production is more important than testing, so TSO and test-class jobs have the lowest system priority. What does it really cost in terms of both money and morale to have a dozen programmers asleep at terminals waiting for a TSO response? Also, how will that production job run if those experienced programmers get tired of waiting and leave altogether?

The capacity problem aggravates the task allocation problem. With turnaround down to once a day, the programmer may be productive for only two hours and may be "killing" six hours a day. Boredom and lack of achievement result.

Another programmer sees the person wasting six hours while he is swamped with work, and the result is resentment and further morale problems. Finally the new computer arrives, turnaround improves and everyone is expected to again work a full eight hours. Having been in the habit of working only two hours a day, however, they may take several months to regain productivity. By that time, every headhunter in town has their resumes. You know the rest of the story.

Gary O. Young
North Hollywood, Calif.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to Editor, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

READER COMMENTARY/Thomas F. Jones

Can U.S. Hold Technological Lead?

Our technical leadership is not lost. But before you sigh in relief, let me add that our leadership is severely threatened from, seemingly, all directions. In particular, the threat comes from 1) other technological nations, especially the Japanese, 2) the federal government, 3) certain innate changes in our society and 4) energy supply problems that seem, so far, to be beyond our control.

Our balance of trade in technology-intensive products was about $18 billion in 1978 (but horror of horrors, it appears to be on a roller coaster and has declined from a high of $28 billion in 1975). Entry into the export business by a number of small companies may turn it around.

Overall, the deficit for last year was nearly $30 billion, and projections for the future are even higher. This matter must be viewed with grave concern.

Desperate Fight

The nations of the Western world and Japan have become a trade group whose members are fighting desperately among themselves for trade dominance. However, the fight seems to be futile, because the Organization of Petroleum Exporting Countries (Opec) controls the world price of energy. Opec has a stranglehold on the U.S. for $70 billion per year, and until and unless things change, that figure will escalate at rates Opec will control.

Where does all this leave us? What can we do? How should we do it?

On the basis of these and other observations, I would put the following items high on the agenda for action by Americans. I recommend the following actions by industry:

1. Raise your sights. In your own industry and through your trade associations, try to develop a longer term outlook — an outlook beyond your quarterly return on investment, which seems to have become the accepted measure of success in American business.

Too many industries have already chosen, for reasons of return on investment, to close down the plant, get rid of the unions, retain the sales and marketing force and become the U.S. distributor for Japanese industries. Each of these decisions, though profitable, moves America one step nearer to the colonial status from which we escaped more than 200 years ago.

2. Modernize your plant and make long-term plans to make it as productive as the best. In making this recommendation, I recognize the impossible present status of the money market and government tax structure. These must change — more on this in a moment.

3. Deal with the problems of apathy and indifference of workers in U.S. industry. Consider seriously and with care the use of intensive training programs for all production workers. Our times call for changes in both skills and attitudes if we are to compete successfully with Japan and West Germany today and with Taiwan, Korea, Mexico and Brazil tomorrow.

Advice to Government

I recommend the following actions for government:

1. Bring U.S. research spending by government and industry up to a percentage of the gross national product (GNP) reasonably commensurate with the nations that challenge us in high technology. Government should increase research appropriations, and incentives should be restored for industry. American research and development as a proportion of GNP is presently about two-thirds that of the challengers.

2. Allow tax credits for industrial investments in basic research at universities. The universities and industries would be brought into a closer relationship and the relevance of university basic research to industrial needs would be greatly enhanced. At present less than 10% of university-research is funded by industry and more than 90% is funded by government. These proportions are far from optimum for technology transfer.

3. Drastically revise state and national laws to remove disincentives for savings so that capital can accumulate to redevelop our industries. (Japanese save more than 20% of their income, on the average. Americans save about 5%.) The shortage of capital funds is, obviously, a serious limitation in our economy.

4. Liberalize tax laws to provide as much incentive as necessary to promote investment in plant modernization.

5. Develop a clear and strong foreign trade policy. Create a unified and powerful government office to implement, stimulate and oversee exports.

Present policy is fragmented among several of the executive departments with none clearly in

(Continued on Page 50)

THE TAYLOR REPORT/Alan Taylor

Forth May Help Cobol Users

I recently visited and talked with a number of users of Polyforth, a language put out by Forth, Inc. (2309 Pacific Coast Highway, Hermosa Beach, Calif. 90254), as well as with some of that company's programmers. As a result of these talks, I think there may be a technical method, as opposed to a legal one, for handling the Cobol standard conversion problem.

This particular technique could almost certainly avoid costly Cobol conversions every five years or so. While these conversions have been the normal and expected cost of progress within the Cobol hierarchy, Cobol users have never willingly agreed to pay the costs that such constant conversion activity entails.

Let's look at the problem and then at Forth.

The Cobol Problem

The primary Cobol conversion problem is to maintain upward compatibility in a new standard. New standards do *not* come from the American National Standards Institute (Ansi) with such compatibility built in. Indeed, I can't find any real consideration of this user problem in the Ansi X3J4 committee charter. And, however unpopular the situation may be, that's life.

Because of the recent threat of user lawsuits against X3J4 members, this problem was still on my mind when I went to visit Forth, Inc. to look for the library of "vocabularies," equivalent to repeatedly used subroutines, that Forth, Inc.'s analysts must — I mistakenly thought — be using. During the visit, I stumbled across the difference between the usual vendor-dependent, Cobol-style maintenance and Forth-style, vendor-independent maintenance.

Forth is an extensible language. The user can create new words and store them in special vocabularies. These vocabularies seemed to me to be Forth's great strength.

In Engineering, Business

I knew these individual vocabularies existed. I had already seen them at various specialized user sites running radio-telescope and engineering applications, such as process control systems or laser experiments. I had even seen — and written here about — proprietary commercial Forth vocabularies operating successfully in the basic Cobol commercial world. These vocabularies are handling banking applications and general file program generation.

However, after traveling across the country to see the big library of vocabularies that would give me proof of Forth's range of applications, I was told there was no such library!

Next I looked for documentation of specific applications written by Forth, Inc. for particular users. I had no trouble finding the documentation library, but had a bit of trouble believing I had gotten all of the application documentation. I had expected to be shown anywhere from about four to 20 two-inch binders, or their equivalent, for each application. However, all I got was a single one-inch binder for each.

There were no separate source codes and no separate binders of specification such as a user's guide. But most significant, there was no — repeat, *no* — maintenance documentation. That was the key.

I began to suspect that, as often happens, the technical details of Forth (with its threaded implementation, nonprocedural instruction codes and, of course, its reverse Polish notation within the system itself) had been hiding a most important breakthrough — an ability to do

(Continued on Page 48)

HUMAN CONNECTION/Jack Stone

Performance Appraisal Uses Standard Format

In recent columns, I discussed a project involving the reorganization of an end-user department. My role was to provide assistance in developing and documenting organization functions, position descriptions covering all steps of all career paths and a new performance appraisal system. The long-range aspiration is to apply the strategy to other components of the organization, including the computer center operation.

The final pass at the documentation is now complete, and the performance appraisal system is in pilot test. Following is a brief summary of the system.

The appraisal starts with the identification of all major job elements. "Products" are then defined for each element. One worksheet is a scorecard on which each product is rated in terms of six factors: results, timeliness, quality and completeness, manner of performance, method of performance and workdays applied.

Point values are assigned from 5 to 1, covering the qualitative range from "outstanding" to "unsatisfactory." The points are summed and averaged, and a final numerical value for the job element is computed.

A second worksheet is used to summarize the point and qualitative ratings for all job elements, and an overall performance rating for the individual is derived. Provision is made for the evaluator's notes.

Summary Form

The client organization's personnel department established a summary form on which the operating department completes the following fields: type of element, name of job element, performance standards, overall rating and narrative.

Early in the project, we decided that the performance standards should be uniform for all personnel, comprehensive and concise. We established standards for the marginal, satisfactory and excellent levels only, with the unsatisfactory and outstanding levels implied. Here are the three standards:

- **Marginal level.**

(Continued on Page 50)

LETTERS

CPAs Can Help Out

In his letter "CPAs' Drawbacks" [CW, March 30], Jerry Cooper attacked the qualifications and abilities of certified public accounting (CPA) firms that provide DP assistance.

As a consultant experienced in working with CPA firms and their clients, I can categorically state that Cooper's experience with a "Big Eight" accounting firm is not representative of the accounting profession in general. While I cannot claim extensive knowledge or experience regarding the Big Eight firms, I can state that many of the smaller CPA firms (local and regional firms, as opposed to national) recognize the need for DP assistance for themselves and their clients.

Accordingly, many of the firms either develop the expertise on staff through recruiting or training or fall back on the expertise of an independent consulting organization such as ours.

By utilizing outside services for systems projects, the auditor can comply with the legal and ethical requirements for independence "in fact and in appearance." If the client is a nonaudit client, many CPA firms recognize the value of using outsiders whose primary concern is providing quality system selection and implementation assistance (as opposed to selling hardware and/or software).

Obviously, as in any other field, there are accounting professionals who may choose to violate their own profession's requirements regarding competency and independence. However, the potential user of such assistance should carefully check the experience and references of any potential outside contractor, and the CPA firm is certainly one possible supplier of such assistance.

Steven D. Sass
Vice-President
Management Systems
Advanced Resource Development
Columbia, Md.

Poor Analogy

The analogy regarding leukemia in the last paragraph of "Short on Teachers, School Cutting Enrollments" [CW, March 23] was quite misleading. Unpopular as punched cards are, I can assure you that waiting in line for a keypunch or a terminal is far, far less a trauma than waiting in line at a crowded hospital clinic to receive chemotherapy for your child.

I can state this with authority having waited for both key and terminal devices during my college experience, listening to my wife tell me of her current college experience with key and terminal devices, and waiting with my wife while our son receives treatment for his leukemia.

Writers should be more careful with their choice of analogies.

Herbert G. Reines
Potomac, Md.

Forth Might Give Solution

(Continued from Page 47)

without vendor maintenance.

Almost all Forth users can maintain their own applications, including handling new concepts such as are being introduced in each new Cobol standard! They have what Cobol users don't — upward compatibility.

If Forth can give upward compatibility, I thought, could a Forth-based Cobol compiler be a way out of the Cobol conversion mess?

One user, Stanley Smith of Wilmington, Mass., has designed a data base management system in Forth, as well as a number of instrumentation packages. He commented that Forth would be "superb" for handling the maintenance involved in changing language definitions and adding new concepts. He based this view on his own experience in allowing newly developed facilities to be incorporated into applications.

Gordon Webb of Beverly, Mass., discussed the user-conversion reality of having to run two different standards at one time. He pointed out that by use of selective "FORGETting," a Forth method of changing the vocabulary to be used in the compiler, it should be possible to have the two different standards implemented in a single multistandard compiler. This way a user could run an old standard side by side with a new one.

This technique would permit a user of a Forth-based Cobol-81 to look forward with confidence to Cobol-86, Cobol-91 and so on.

But the immediate problem is the Cobol-81 conversion. This does require an imaginative approach.

Of course, none of the current Cobol-74 compilers are written in Forth. And there seems no good reason to expect a Forth-based compiler to come out so late in the game. Therefore, it seems unlikely that the conversion to Cobol-81 will be helped.

But if some future Cobol-81 compiler were written in Forth, users could at least hope for an easier conversion in the future — and perhaps, like current Forth users, they could then alter the Forth Cobol-81 to meet their Cobol-74 requirements!

This approach may well be cheaper than those millions-per-user conversion estimates that are coming out.

' Copyright 1981 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for noncommercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

COMPARE FLEXIBILITY.

Model 950
- Advanced editing with wraparound
- Smooth scrolling
- 15 baud rates (50B to 19.2kB)
- Protected fields
- Underlining
- Split screen with line lock
- Non-glare screen
- Programmable function keys
- 15 special graphics characters
- Versatile screen attributes
- Self test
- 25th status line
- Buffered auxiliary port
- 14 X 10 character resolution
- Integral modem option
- Tiltable screen

Tailor this smart CRT terminal to your particular needs and make it your own. It has the flexibility and brains to provide all the performance you need but is priced to make sense whether you need 10 or 1,000.

The TeleVideo model 950 detachable keyboard CRT Terminal has 11 special function keys—22 functions with the shift key—that can readily be programmed to your requirements using 256 bytes of on-board RAM.

You needn't stop there. You can change keys, key functions, even keyboard locations. And the 950's microprocessor based design means you can customize the firmware for your system.

Of course the 950 has premium TeleVideo performance—advanced editing with wraparound, split screen with line lock, and smooth scrolling. It also features a 25th status line, speeds to a true 19.2 kilobaud, and 15 special characters for powerful line graphics.

Contact TeleVideo for a detailed brochure, or call today to discuss how you can use these capabilities to make this terminal uniquely yours. TeleVideo, Incorporated, 2149 Paragon Drive, San Jose, CA 95131. (408) 946-8500.

Nationwide Field Service is available from General Electric Company, Instrumentation and Communication Equipment Service Shops.

TeleVideo®

COMPARE PRICE.

CALIFORNIA Santa Ana (714) 537-6095 • San Jose (408) 946-8500 • MASSACHUSETTS Boston (617) 668-6891
NEW YORK/NEW JERSEY Morris Plains (201) 267-8805 • TEXAS Dallas (214) 980-9978

People Are 46% Of Your DP Dollar

Improve their productivity with the one company that meets all of your training needs.

While the industry in general has focused on improving performance through the use of hardware and software monitors and other aids, Advanced Systems, Incorporated has been concerned exclusively with the productivity of the most significant element of your DP dollar—People. For more than 12 years ASI has provided cost effective training delivery systems to improve people productivity.

These delivery systems now include Video Assisted Instruction, Productivity Skills Development and Live Education Delivery. With the introduction of two entirely new products for 1981, CAI and ASPRIS, ASI has *harnessed technology* to provide the first comprehensive integrated training system to address today's requirements. It is based upon a systematic *train/test/retrain* approach to increasing individual productivity.

VAI (Video Assisted Instruction)

With over 3,000 titles in its Library, ASI provides you with the largest, most comprehensive multi-media training resource available. Over the past 12 months, ASI has added some 250 additional titles in such vital areas as DOS/VSE, CICS, Corporate DP Strategies, Structured Cobol (exclusively developed by Daniel McCracken), data base, IMS/DL/1, microcomputers, distributed processing and data communications. The unique instructional design methodology used in all of ASI's multi-media courses matches the appropriate training medium to the subject. This design methodology delivers specific job related skills through effective interplay of video, audio and text.

ASI's extensive multi-media curricula covers basic DP concepts through advanced technology. We provide skills training for programmers, analysts, operators, management and end users.

CAI (Computer Assisted Instruction)

Today only ASI can deliver the complete CAI training program for interactive placement, simulation and testing.

Placement to insure that you begin the training at the point where it is needed. With over 160 placement sessions available today you can immediately begin placement of your staff in a wide variety of skill areas.

Simulation to recreate the actual working environment so that the newly acquired skills can be practiced and mastered before they are used on the job. There are 20 simulation sessions available today in a variety of subjects with many more planned for future monthly release.

Testing to reinforce the learning experience and control the "skills transfer" process. More than 160 testing sessions are available today for accurate training diagnostics, with more to come.

ASPRIS™ (Advanced Systems' Planning, Reporting Information System)

Developing curricula tuned to the application project can insure that a shortfall does not exist between the project tasks required to do a job and the availability of people skills. By providing a tool for the all important analysis and design of project oriented training plans and by automating the time consuming administrative activities, the training functions' contribution to the overall data processing effort can be significantly enhanced. By matching tasks to available skills, you can be sure that personnel resources will not be a constraint on producing projects on time and within budget. In order to facilitate this approach, ASI is offering the first preprogrammed, fully interactive training management system, ASPRIS.

ASPRIS is the first data base management system specifically designed to assist in managing the training function. Composed of seven subsystems, ASPRIS addresses the key issues in training management. It is a turnkey system, fully operational upon delivery and requires no in-house technical resources.

LED (Live Education Delivery)

Finding the appropriate training staff who are technically competent and instructionally experienced for classroom training is a continuing problem. In many instances the need is periodic and the resources are unavailable or too costly for permanent hire. ASI through its LED can provide your organization with a full range of services; stand-up training, group facilitating, as well as customization of courses, to meet your unique requirements.

Stand-Up Training—available on-site or away, technically competent, professional instructors offer a variety of standard classes.

Group Facilitating—focusing on key areas of data processing (IMS, CICS, MVS, etc.), well trained educators and facilitators offer the dynamics of group interaction in conjunction with standard ASI multi-media training.

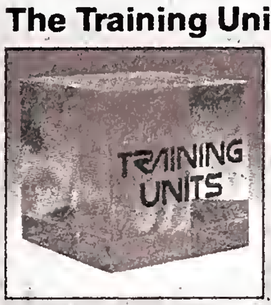
Customized Courses—training specialists will design workshops, lab exercises and tests based on your specifications and your objectives.

PSD (Productivity Skills Development)

On-line data entry requires a continuing commitment to training especially in the distributed environment which involves greater numbers of people who regularly input and retrieve data. Training, therefore must include not only your full time data entry staff but other terminal users who require basic keyboard skills training, as well as techniques to improve the speed and accuracy of data entry.

Productivity Skills Library courses include training in such areas as data entry training, 3275/3277 and 3276/3278 function key training, 3760 operator training, word processing, secretarial skills, bank proof operation, bank teller skills, and more.

ASI Is Announcing A New Concept—The Training Unit



The Training Unit permits you to identify your training requirements in a standard unit of measure. This standard unit of measure can be used to acquire any of ASI's products and services. With the Training Unit contract you can draw upon ASI's products and services in any mix you wish. *The Training Unit puts you in control of your training dollar.*

For further information write to:
Advanced Systems, Incorporated
Department AR
2340 South Arlington Heights Road
Arlington Heights, IL 60005
Or Call: (800) 323-6058

ASi The Total Training Resource

Can U.S. Technology Stay on Top?

(Continued from Page 47)

charge. The American industrialist who wishes to venture into foreign markets seems to get as much flak as favor.

6. Revise antitrust laws and attitudes to fit our times. This is not the age of the robber barons, but an age when the American economy is threatened by eager foreign competitors and internal strangulation by outmoded laws, regulations and interpretations. (Recall that Japan started anew in 1945 and rearranged its world to conform to American ideals, as Japan understood them!)

American industries should be able to form consortia to develop new technology, just as the Japanese do. The government should assist in setting up acceptable operations rather than taking what seems to be a continuously threatening stance.

7. Industry and government, together, should take a look at the consequences, and possible modes of control, of the early export of American high-technology know-how. I believe we need the early years of a new development to gain the benefits of our research and proprietary knowledge. We need to share those benefits with our working force for some years before transplanting the technology abroad. U.S.-based technology would contribute 10 times more to the U.S. economy than can be realized from the sale of naked technology.

8. Move toward energy independence. If we are not to be, literally, owned by the major Opec countries, we must move as rapidly as possible toward energy independence. We must clear up the roadblocks to nuclear power, coal, synthetic fuel from shales and biomass and direct utilization of biomass to the greatest possible extent. In addition, we should explore solar power, wind power and energy conservation.

9. Set some clear national goals. A recent issue of the *Japan Economic Journal* reported on a Japanese Foreign Ministry study on U.S. exports, problems and prospects. The report was quoted as saying the U.S. has no clearly articulated industrial plan or goals. I believe that finding is correct.

Who are we and where are we going? What should we do to get there? Until these questions are answered, we will be in disarray and retreat although, miraculously, we now hold tenuously onto our lead.

A major item on America's agenda, therefore, is to surmount this identity crisis and understand what America and Americans must be or become in the 1980s.

No nation in the world has the opportunity that is ours. If we persevere, our leadership, technological and otherwise, cannot be successfully challenged by any other nation.

Jones is vice-president of research at MIT.

Appraisal Uses Standard Form

(Continued from Page 47)

Results — not met; issues and problems handled poorly; product caused more problems than it resolved; product rejected by recipient(s) more than once.

Timeliness — product late.

Quality and completeness — unacceptable.

Manner of performance — immature, unprofessional and with a less-than-positive attitude; employee rejected constructive criticism.

Method of performance — product developed outside of standard operating procedures or without guidance from supervisor.

Workdays applied — exceeded plan.

- **Satisfactory level.**

Results — goals met; some important issues and/or certain identified problems resolved in routine ways.

Timeliness — product on time.

Quality and completeness — product responsive, accurate, grammatically correct, complete and consistent with policy and procedures.

Manner of performance — mature, professional and with a positive attitude; employee accepted constructive criticism.

Method of performance — product developed with standard operating procedures and supervisor contacts as required.

Workdays applied — within plan.

- **Excellent level.**

Results — Goals substantially exceeded expectations; most issues and identified problems resolved in resourceful and creative ways; recommendations submitted for policy, procedural or operational changes.

Timeliness — ahead of schedule.

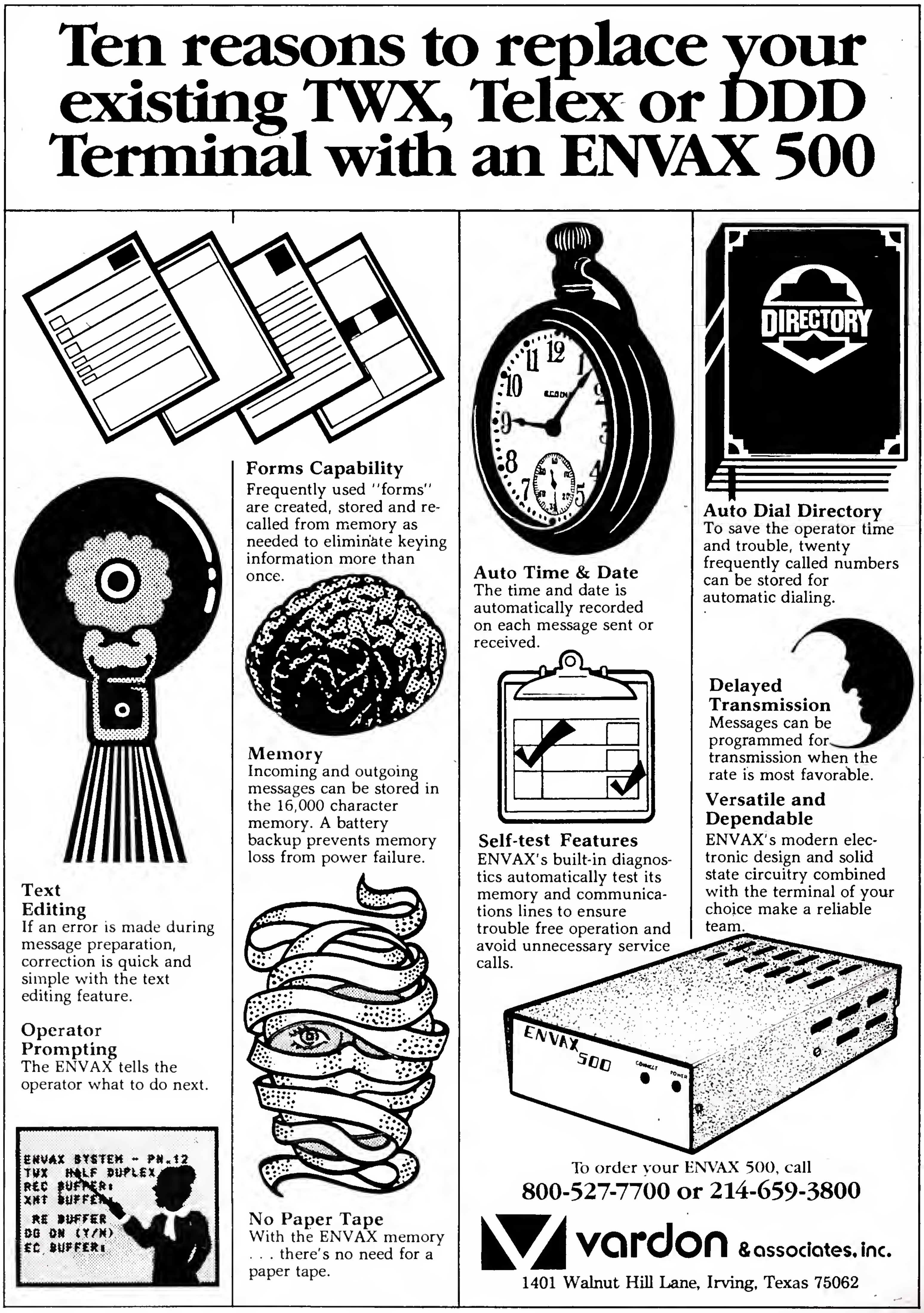
Quality and completeness — product evidenced high level of reasoning, logical presentation and creativity; employee demonstrated comprehensive knowledge of the subject matter.

Manner of performance — employee exhibited strong leadership qualities and made suggestions on improvement of products and policies.

Method of performance — product was developed with innovative procedures; employee demonstrated initiative and, as required, obtained a consensus of interested personnel to support the methodology.

Workdays applied — fewer than planned.

I'll keep you informed of major developments in the project.



Ten reasons to replace your existing TWX, Telex or DDD Terminal with an ENVAX 500

Forms Capability
Frequently used "forms" are created, stored and recalled from memory as needed to eliminate keying information more than once.

Auto Time & Date
The time and date is automatically recorded on each message sent or received.

Auto Dial Directory
To save the operator time and trouble, twenty frequently called numbers can be stored for automatic dialing.

Memory
Incoming and outgoing messages can be stored in the 16,000 character memory. A battery backup prevents memory loss from power failure.

Delayed Transmission
Messages can be programmed for transmission when the rate is most favorable.

Versatile and Dependable
ENVAX's modern electronic design and solid state circuitry combined with the terminal of your choice make a reliable team.

Self-test Features
ENVAX's built-in diagnostics automatically test its memory and communications lines to ensure trouble free operation and avoid unnecessary service calls.

Text Editing
If an error is made during message preparation, correction is quick and simple with the text editing feature.

Operator Prompting
The ENVAX tells the operator what to do next.

No Paper Tape
With the ENVAX memory . . . there's no need for a paper tape.

To order your ENVAX 500, call
800-527-7700 or 214-659-3800

vardon & associates, inc.
1401 Walnut Hill Lane, Irving, Texas 75062

THROUGHPUT

STC can help you realize greater productivity from your information processing system with products designed for maximum performance.

Products such as the STC 4305 Solid State Disk. This high-speed device improves paging rates and enhances total system throughput far beyond any other device available today.

The STC 8000 Series disk family provides the industry's fastest response times. Innovative features such as dual port, multiple recording formats and media interchange switch offer you higher capacity, optimum performance and greater reliability. Our STC/Documation 3000 Series impact printers with speeds beginning at 1550 LPM are upgradable to 3000 LPM as your throughput requirements increase.

STC tape products with their proven reliability make STC the world's largest supplier of high performance tape subsystems.

We have solved throughput problems for some of America's most demanding users—often at significant cost savings. To find out how STC can help you, call the STC sales office in your area. Or call us in Colorado at (303) 673-4063. Storage Technology Corporation, MD-3M, 2270 So. 88th Street, Louisville, CO 80027.

We can help.

STORAGE
TECHNOLOGY
CORPORATION

Fulfilling the promise of technology.

LETTERS

Off-Site Storage

The title of John P. Murray's In Depth article, "Protecting Corporate Data With Off-Site Vault Storage" [CW, March 16] was misleading and not supported by the article's contents, much to the author's credit. The article stressed *off-site file storage* at an adequately protected location. It neither demanded nor implied that a vault is an essential ingredient.

I take exception to a couple of points made by the author:

1. Excessive emphasis was placed on the data center operations manager. In many instances, responsibilities assigned by Murray to this individual really belong to the users and the system design staff. It is the responsibility of the data center operations manager to make the facilities and procedures available for use. It is the responsibility of the user and systems staff to determine what, when and for how long.

2. While it may have been unintentional, the article implied that files having retention requirements that exceed the period necessary for disaster recovery should be retained at the off-site location until they expire. In many instances, this is incorrect. Use of such logic can unnecessarily inflate costs.

The primary goal of off-site storage is to provide for resumption of business after a serious data loss at the prime site, whatever the reason. Under these conditions, the need for historical data is minimal or nonexistent. Thus, most long-term files can be returned to the data center once their disaster recovery function at the off-site location has been satisfied.

3. Users that require long-term storage for legal or regulatory reasons should remember that such files can be destroyed in transit or at the off-site location. Therefore, two copies of such files should be considered, with one at each site.

4. When keeping such files for long periods (more than two years), it should also be kept in mind that magnetic media do deteriorate with time. Therefore, it would behoove those retaining tapes for longer periods to review and consider the recommended guidelines for preservation of magnetic tapes published by The Data Archives Branch, National Archives and Records Service, Washington, D.C.

An excellent article that was a service to the industry.

Robert E. Johnston
Hartford, Conn.

Helpful Reference

I enjoyed Richard A. Zahniser's article, "How to Navigate the User Fog" [CW, March 16]. It was well written.

In response to his request for suggestions, an excellent description of my dream of how to build an application system is in the article "The Evolution of an Information System: From Key-Man to Every Person" by Henry C. Lucas of New York University. It was published in *Department of Defense Computer Institute, Selected Computer Articles 78* and is copyrighted by the Sloan Management Review Association.

William D. Miller
Boise, Idaho

P.O. Pamphlet

In response to a letter of mine, I recently received a pamphlet on "Highlights of the Nine-Digit Zip Code." I believe anyone who wishes a copy may write to the Office of Zip Code Expansion, Research and Technology Group, U.S. Postal Service, Washington, D.C. 20260.

I cannot speak for the U.S. Postal Service, but this pamphlet may clarify its position.

Paul E. Black
Salt Lake City, Utah

Charts in Error

I simply could not believe the number of errors in the "pie charts" on pages 10 and 11 of the March 2 issue. Sections were not to scale and were misnamed. Let's hear it for computer graphics (or poor proofreading).

Gosh, I hope most users have not reviewed the errors. Pity those who are attempting to sell the "brass" on graphics. If the "brass" have seen that issue, their efforts will be in vain.

E.A. Thomas II
Lynnwood, Wash.

IT'S NEVER BEEN TOUGHER TO CONTROL COMPUTING COSTS

MARTIN MARIETTA GIVES YOU ECONOMIES OF SCALE

Stop and take a look at your computing costs. Overall systems and software expenses have risen sharply. Salaries for qualified DP people are skyrocketing.

The only way to really keep ahead of rising computing costs these days is for you to get more from each computing dollar. That's precisely the idea behind our Remote Computing Services.

With Martin Marietta Data Systems, you keep pace with your DP needs, while avoiding long-term capital commitments for hardware or software that you may soon outgrow. We give you access to large-scale IBM and CDC computers, state-of-the-art systems and applications software, and top DP specialists. But you pay only for the exact resources, priority of service, and software environment that meets your immediate needs. In fact, the economies of scale of our remote computing services can be your most economical computing alternative...anywhere.

Most important, you get help when you need it. To cover peak demands. To prepare you for a conversion. To accommodate your growth at whatever rate you desire. Martin Marietta Data Systems extends your resources, without overextending your budget.

Your first step to more manageable computing costs can be as simple as calling one of 20 Martin Marietta Data Systems' offices across the U.S.A. Or contact Marketing Services, Martin Marietta Data Systems, 6301 Ivy Lane, Greenbelt, Maryland 20770, (301) 345-0100.

MARTIN MARIETTA DATA SYSTEMS
YOU CAN GET MORE FROM COMPUTING

Software Testing — Part 1

Test Plan Essential for Software Reliability

By A.F. Grilz

Special to CW

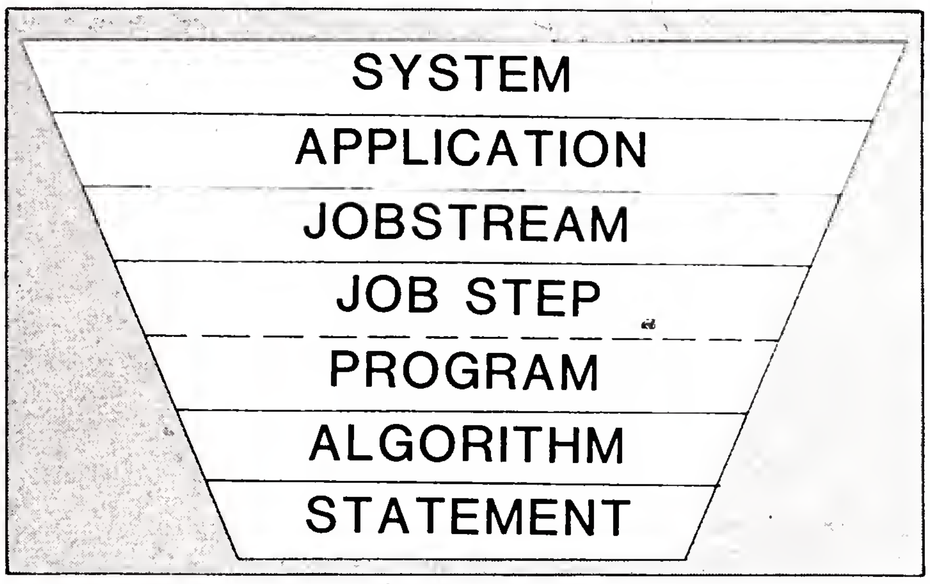
ST. PAUL, Minn. — The development of an adequate test plan is essential for software reliability. In addition to its function of quality assurance, a test plan helps to develop the user's confidence by increasing awareness that DP is concerned that the software be reliable. The plan can also promote job security for the technician by creating a solid record of programming success.

Software testing is an undeveloped area in the DP environment, according to systems analyst Grilz. Part 1 of this three-part series provides an overview of the various software levels and the scope of testing that these levels require.

Although there is no such thing as "too much testing," there is a point at which the programmer must decide on a method that will achieve a high degree of reliability in a reasonable amount of time.

Software generally exists in a series of layers. Beginning with the highest level, these layers include the system, applications, jobstreams, jobsteps, programs (which may or may not be jobsteps), algorithms and individual program statements (see related diagram).

For example, the software levels could consist of a financial system with accounts payable, accounts receivable, general ledger and payroll applications.



Software Layers

A jobstream would be master-file maintenance that included a file sort utility jobstep and file maintenance that is broken down into another file sort utility jobstep and a file update program. This program might include a data validation algorithm which, in turn, would contain a file read statement.

At some point within these software levels, the programmer or analyst is called upon to perform his particular function. An analyst might be responsible for the entire system, while a programmer might work only with a few levels within the system.

Regardless of the scope of official responsibility, the individual who performs the software test must be aware of how the item being tested affects all levels. Failure to maintain this awareness can cause serious problems even when the test of a particular level is successful.

Whatever the level of software being tested, its performance should be checked out under three conditions: normal operation, input of invalid data and unusual or abnormal situations.

Software performance testing

(Continued on Page 54)

Banking Support Added To Cullinane DBMS

WESTWOOD, Mass. — Cullinane Database Systems, Inc. has introduced the Customer Information System (CIS), an on-line information management and retrieval system for the banking industry.

CIS is integrated with Cullinane's IDMS data base management system (DBMS). It is a centralized repository of customer/account information, which reflects relationships between customers, accounts, addresses, detail transactions and history.

The CIS package reportedly supports most major bank application systems, including demand-deposit accounts, savings accounts, certificates of deposit, installment loans, Master Charge, Visa and the bank's own automated teller machine debit card.

The DBMS provides storage efficiency, data integrity and backup and recovery mechanisms, as well as support for components such as the Integrated Data Dictionary, the Culprit report generator and an integrated teleprocessing monitor, the vendor said.

With Cullinane's Universal Communications Facility, the company claimed CIS is operational in any teleprocessing environment.

CIS is priced at $125,000 and will be available for general use this summer. Appropriate Cullinane Data Base Systems components are additional, the vendor said from 400 Blue Hill Drive, Westwood, Mass. 02090.

IDMS Preprocessor Provides Consistent Pointer Assignment

OAKLAND, Calif. — Pointers, a preprocessor for Cullinane Database Systems, Inc.'s IDMS data base management system, determines a consistent assignment of pointer positions and places the proper descriptive lines into the schema, said its vendor, Computer Results.

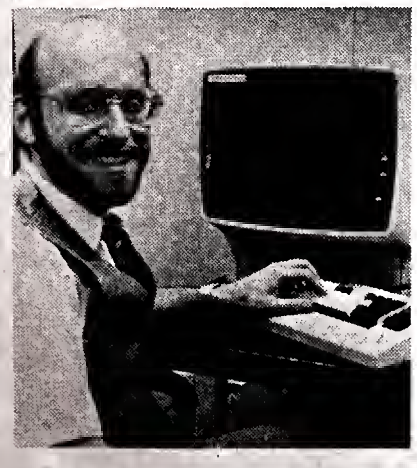
This eliminates data base designers' former task of explicitly assigning positions within the prefix of each record for all the possible Next, Prior and Owner pointers for all sets in which the record participated.

If an existing schema is being changed, Pointers will generate appropriate lines for new set descriptions while leaving explicitly declared pointer positions intact.

Pointers is written in Ansi Cobol, and source code is provided. The product is available for $500 from Computer Results at 629 Oakland Ave., Oakland, Calif. 94611.

Attention: IBM DOS/VS/E Users

DOSSIER IMPROVES DOCUMENTATION AND STANDARDS



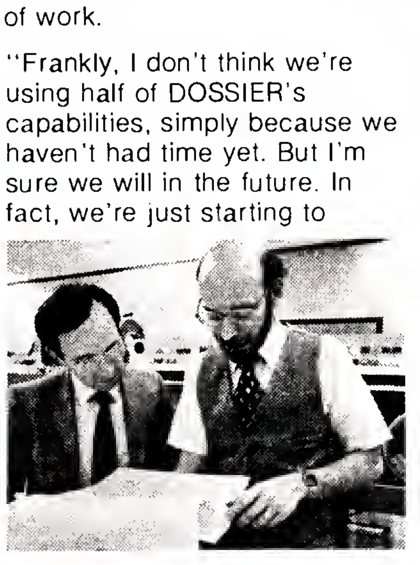
Here's what Richard Amster, Systems Programmer, Precision Castparts Corp., says about DOSSIER:

"It's just a tremendous tool. We use DOSSIER on our IBM 4341 to tell us all we need to know about file and program usage. Our programmers and analysts use DOSSIER constantly, day in and day out.

"I don't think there's a product to compare with DOSSIER. The Called Program Analysis facility reads the object code in a program to find out whether another program uses it, rather than just looking at names. And this is really a very sophisticated thing to do.

"DOSSIER's given us a degree of control over documentation and standards we couldn't have achieved without many months of work.

"Frankly, I don't think we're using half of DOSSIER's capabilities, simply because we haven't had time yet. But I'm sure we will in the future. In fact, we're just starting to implement the DOSSIER Library Audit, which looks like it's worth the package price alone."



Richard Amster is not alone in his enthusiasm for DOSSIER. More than 650 customers currently use DOSSIER to clean up, maintain, and audit DOS, DOS/VS and DOS/VSE libraries. DOSSIER is also invaluable for conversions.

Try DOSSIER free, without obligation, for 30 days. For more information, just clip this coupon and mail to Computer Concepts, Inc., 6443 S.W. Beaverton Highway, Portland, Oregon 97221. Or call 503/297-4741.

Send me:
☐ More information about DOSSIER.
☐ A 30-day Free Trial.

Name
Company
Address
City
State/Zip
Telephone number

DOSSIER™
Documentation & Standards Tool
a product of
CCI

NIH's 'Wylbur' Upgrade Free

BETHESDA, Md. — An upgraded version of the Wylbur system has been implemented by the National Institutes of Health (NIH) here. Since the package is in the public domain, documentation and information about the new Wylbur is free for the asking — as long as the asking is done in writing, according to an NIH spokesman.

Extended text editing functions, document formatting, message-transmitting facilities, command procedures and job entry capabilities were implemented in the release that went into production mode in January, he said.

Highlighted in the release is a command procedure facility that allows users to adapt the Wylbur command set to their individual needs and to write programs containing commands that will run automatically, because of built-in functions and pseudo-functions.

Command Procedures

Command procedures may involve other procedures and can be used to define and create new commands, he explained.

Variables store information as character strings, real numbers, line numbers, integers and Boolean values and there are special statements to support GOTO-less programming, he continued.

Document formatting enhancements allow users to generate tables of contents and indexes and to paginate test. The TEX hyphenation algorithm is also available, along with features for manipulating scientific text using subscripts, superscripts and Greek characters.

Single-file capacity is greater than 10,000 lines and each line can contain a maximum of 500 characters, according to NIH.

Composed of approximately 150,000 machine instructions, NIH Wylbur runs under IBM's MVS/SP JES2 operating system. However, it can also function in an MVT-Hasp environment, a specialist said.

Written requests for documentation and inquiries about the system should be sent to the NIH Computer Center, Room 2244, Building 12, Bethesda, Md. 20205.

Tool Fits HP 3000s

IRVINE, Calif. — Far-West Data Systems, Inc. has announced an integrated on-line real-time Distribution Management System for Hewlett-Packard Co.'s 3000 computers.

The Distribution Management System was designed for both distribution and manufacturing industry requirements and automatically interfaces with most manufacturing systems, according to the vendor.

The basic package includes order entry, billing and accounts receivable modules. Scheduled to be available in October are the finished goods inventory, general ledger, accounts payable and sales analysis modules.

The system uses HP's Image data base management system and is written in Cobol. Priced for a single CPU license, the basic system costs $30,000, plus implementation support.

The firm is located at 17841 Fitch Ave., Irvine, Calif. 92714.

Software Test Helps Quality

(Continued from Page 53)

under normal conditions with clean data — usually a copy of a production file or a previously used transaction file — is all too often the only test that is run.

Although the software will run under these conditions in the majority of cases, this type of test makes no allowances for problems caused by factors that are out of the programmer's control at the time they occur.

Abnormal job termination by a computer operator, improper closing of an indexed file, a simultaneous attempt by two users to access identical data via an on-line program and the sometimes mysterious appearance of alphanumeric data in a numerically defined field are examples of these factors.

Faced with a condition of this type, will the software continue to perform or will it crash?

Primary Consideration

The effect of invalid data or unusual logical cases should be a primary consideration during the software test. Although it is sometimes difficult to set up the invalid conditions, this is a critical aspect of the testing phase. It is the untested condition that results in midnight phone calls to the programmer.

Experience is perhaps the best teacher for those trying to test the abnormal condition. Try to anticipate problems by observing what went wrong with other systems and programs. Above all, don't hesitate to experiment and to try the "impossible."

Check out as many conditions as possible in the time available for testing. Be generous with the testing time estimates for any project. The amount of testing is usually inversely proportional to the possibility of software failure — each test decreases the chance of failure in a production environment.

Grilz is a systems analyst for Kroy Industries, Inc.

Total Network Performance Monitoring. Now.

ESP Digital's 3709 NPM offers the telecommunications user a revolutionary degree of network control and performance monitoring, with features found in no other performance monitor available. The 3709 NPM provides real time network control and diagnostics for operations personnel; locates transient line error conditions and TP software bugs for systems analysts; and generates a complete network performance database for the TP manager.

The 3709 NPM interfaces via patch panel or RS 232 connector. The system is available for delivery **today** for BSC and HDLC/SDLC type protocols, with line speeds to over 56K bps, in configurations from 4 to 256 lines. Color CRT and additional protocols optional.

To Schedule a free on-site demonstration call 800-247-2530. In Iowa, call collect 515-287-2578.

Real Time Network Operations Control

Response Time Analysis

Comprehensive Error and Alarm Reporting

Line Utilization/Message Statistics

Remote Line Data-Monitor Function

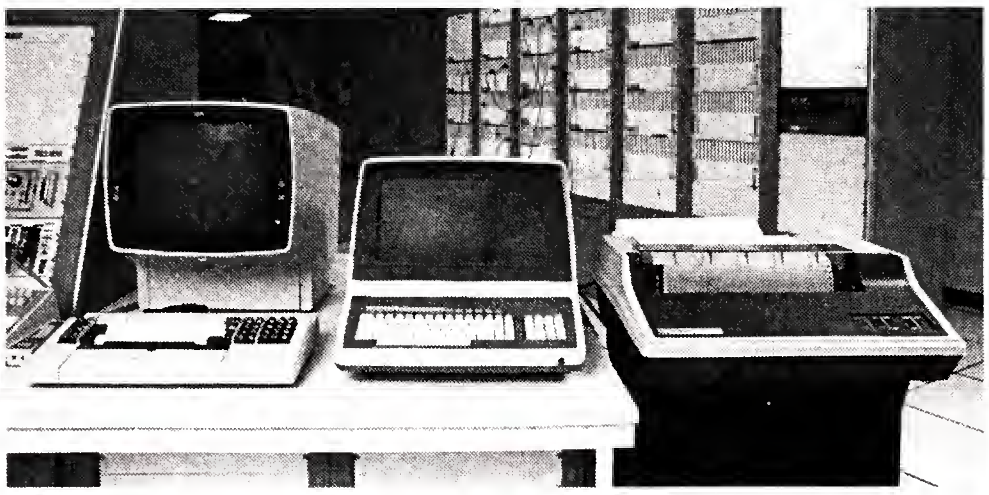
Broadcast Function

Database Generation

Universal Host Interface

Greatest Available Degree of Cost Effectiveness

24 Line government installation.



256 Line corporate facility.

8 Line banking installation.

ESP Digital Systems Corporation *1427 W. Army Post Road, Des Moines, IA 50315*

Runs on IBM 5110, 5120

Accounts Package Targets Clubs

HAMDEN, Conn. — Southwater Corp. released accounting software for the IBM 5110 and 5120 computer targeted specifically at membership clubs with 1,000 or fewer members.

The Southwater Membership Billing and Accounts Receivable System includes transaction posting; automatic posting of recurring charges; automatic computation of service charges, sales tax and dues tax; generation of member statements with optional bulletin messages; and accounts receivable with a finance charge option.

The system can accumulate tips and/or service charges to one or more waitress accounts and provides reports on waitress earnings.

Special collections or charges may be posted to all participating members with a single instruction, Southwater said.

The system reportedly will support up to 30,000 transactions on a two-disk 5110 or 5120 system with 32K bytes of memory.

Reports include selective printing of member names and addresses in report or mailing label formats, listings of charge codes and recurring charges for each member.

Other reports include waitress earnings reports, minimum charge group listings, daily and month-to-date transaction listings, daily and month-to-date sales analyses and monthly member statements.

The system retails for $4,400 and is also available on a rental basis with purchase option, the vendor said from 2348 Whitney Ave., Hamden, Conn. 06518.

Synergetics Adds DOS Version Of 'Pro/Test'

BEDFORD, Mass. — A DOS DL/1 version of Synergetics Corp.'s Pro/Test testing package is now available. It is the final step in making Pro/Test available for both DOS and OS installations, Synergetics said.

The DL/1 data base generator enables users to create any test data base by defining the structure of the data base definitions and the field parameters. Pro/Test generates the DL/1 data base.

The test DL/1 data bases can have up to 255 segment types in up to 15 levels of hierarchy.

The data base generator can create a variety of configurations of segments and segment occurrences. Fields can be created in numeric, packed, character and/or binary.

All generated data bases are documented with the Pro/Test report facility, which is included as a standard feature of the DL/1 data base generator, the vendor said. The Pro/Test parameters can be stored with any source library management system.

The DL/1 data base generator can be purchased as part of the Pro/Test package or as a separate module.

The DOS Pro/Test, which includes a data generator, a DL/1 generator, a file processor and a file checker, costs $16,900. When sold separately, the DL/1 data base generator costs $16,900.

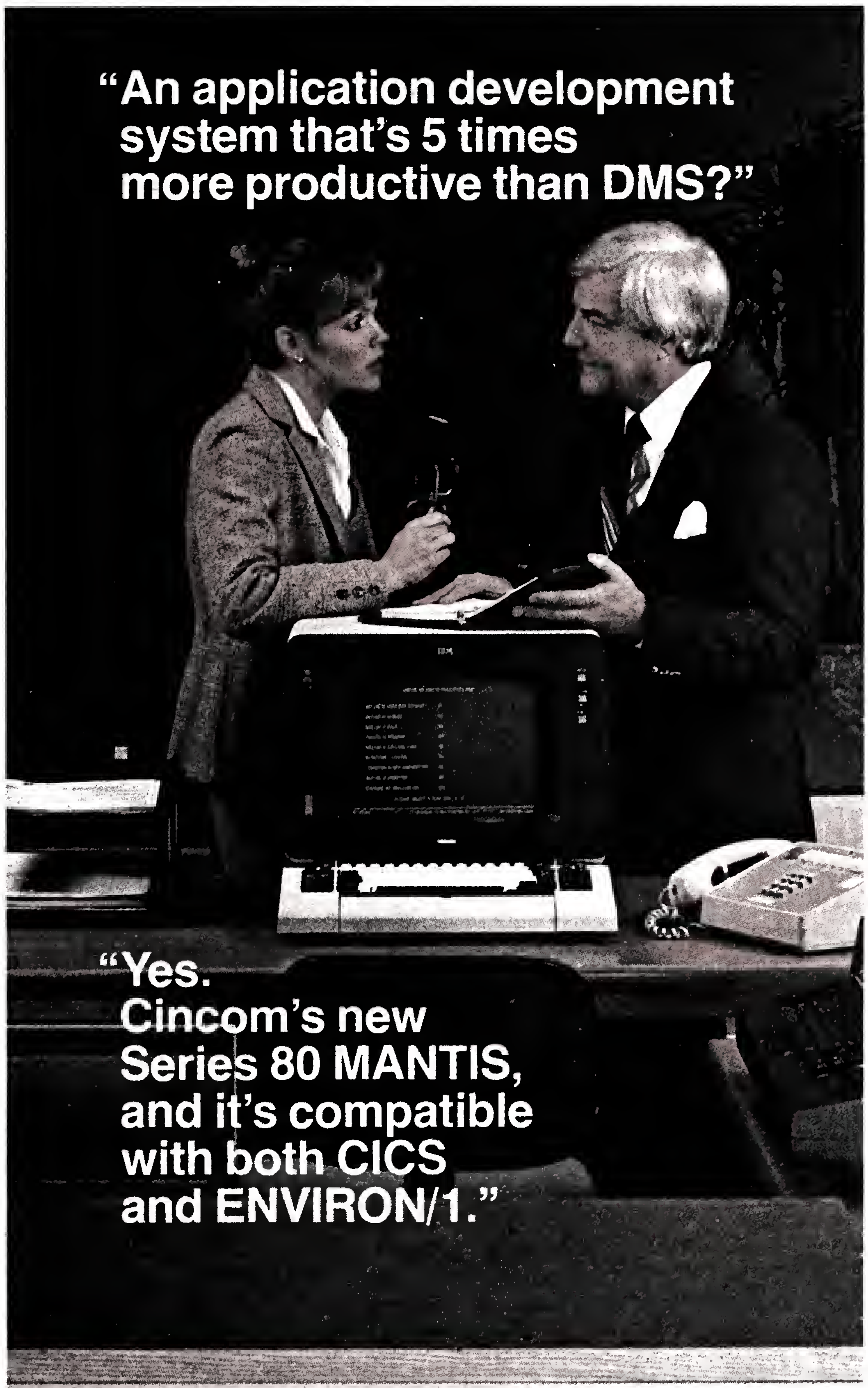
The vendor is located at One DeAngelo Drive, Bedford, Mass. 01730.

System/34 Users Offered Aid for Building Menus

MINNETONKA, Minn. — A software package designed to save time in the building and maintenance of free-form menus on the IBM System/34 is available through Martrex Marketing Services, Inc.

Although designed as a productivity aid to the DP staff, Menuease reportedly also provides the terminal user with a more functional, easier to read menu by allowing the incorporation of special attribute fields such as blinking, high-intensity and reversed fields and underlining.

Menuease carries a one-time license fee of $200. A free demonstration diskette and user's guide is available on request from Martrex, P.O. Box 1-G, Minnetonka, Minn. 55343.


"An application development system that's 5 times more productive than DMS?"
"Yes. Cincom's new Series 80 MANTIS, and it's compatible with both CICS and ENVIRON/1."

Will your system measure up to MANTIS?

	MANTIS	DMS/OTHER
Integrated directory	✓	
Full DOS/OS Compatibility	✓	
High level procedural language	✓	
Conversational debugging	✓	
Runs under CICS or ENVIRON/1	✓	
Menu driven	✓	
Online documentation	✓	
Oriented to both DP *and* end users	✓	
Dynamic file generation	✓	
Logical view access to files	✓	

Cincom introduces Series 80 MANTIS.

Series 80 MANTIS is the first application development system that dramatically increases programmer productivity by eliminating all batch steps in on-line systems implementation.

With MANTIS, the programmer uses an efficient high level command language to develop, test, document, and execute the entire application interactively—all in one sitting. As a result, programs typically requiring 80 hours in batch or 24 hours with DMS can be developed in only five hours using MANTIS.

Running under Series 80 ENVIRON/1® or CICS, Series 80 MANTIS reduces development time for both standard and data base applications. And its ease of use means programmer productivity will begin to increase within hours after installation. In addition, many applications can be developed directly by the end-user.

Tested and proven in leading data processing organizations, MANTIS is an integral component of Cincom's Series 80, the industry's only fully integrated data base/data communications system.

No other system measures up to Series 80 MANTIS. For a demonstration at your site or at a Cincom Service Center, contact our Marketing Services Department.

User Information Hotline:
800-543-3010
In Ohio: 513-661-6000.

Cincom Systems, Inc.
2300 Montana Avenue
Cincinnati, Ohio 45211

'Docu-Master' Upgrade Include Expanded Sort

MONTVALE, N.J. — TSI International here announced Release 1.0.2 of Docu/Master, an IBM-compatible software product for on-line storage and retrieval of textual information.

Enhancements include expanded on-line sort capabilities, prefixing options for the classification of unstructured text, a document display command, expanded support for Teletype Corp. terminals and an increase in file-load performance, the vendor said.

The expanded sort capability reportedly enables users to view selected documents as they were entered, on a last-in-first-out basis, or in ascending or descending sequence up to 20 fields.

The file-load enhancement is said to reduce the run times for updating a Docu/Master data base.

Docu/Master stores, maintains and retrieves unstructured data on-line and through batch processing routines. It is available on IBM 370 and compatible DOS/VS, DOS/VSE, OS and OS/VS operating systems.

The new release is available free to all Docu/Master users. The complete system can be purchased for between $45,000 and $60,000, depending on the version selected. Lease plans are also available, the vendor said from 50 Washington St., Norwalk, Conn. 06854.

'ACF2' Updated To Enhance IMS Support

ROSEMONT, Ill. — Schrager Klemens and Krueger, Inc. has updated its Access Control Facility (ACF2) to enhance support of IBM's IMS data base management system.

An on-line conversational transaction is now provided so that ACF2 user profiles can be maintained from IMS. An IMS installation also can elect to selectively distribute the authority to maintain user profiles to other locations which have IMS terminals, or have this function performed centrally.

Another IMS feature allows grouping of independent transaction names, which reportedly provides additional flexibility in the implementation of ACF2/IMS support.

Standard ACF2/IMS on-line support includes user sign-on verification and control over which transactions a user is authorized to invoke. For IMS batch message processors, ACF2 checks the applicable set of control specifications to determine if the user can invoke the application group name.

Additional options control which terminals a user can sign on to and/or use to submit certain transactions.

ACF2 provides access control on a global, operating system level. It operates on IBM's MVS and VS1 operating systems. Interfaces are included or are available for IMS, TSO, Roscoe, Wylbur, Superwylbur, CICS, Tone-3 and Tone-4, in addition to other user-developed interfaces.

In an MVS environment, the cost is $27,000 for a perpetual license for the first CPU at a site and $18,000 for each additional CPU, the vendor said from 24275 Elise, Los Altos Hills, Calif. 94022.

JCL System Boosts DOS/VS

IRVINE, Calif. — A conditional JCL system that enhances IBM's DOS/VS and DOS/VSE operating system JCL is available from Tower Systems, Inc.

The Tower Smart Proc System (TSPS) enables the user to replace variable parameters with new values at runtime, the vendor said, adding that it also provides the ability to test DOS/VS or DOS/VSE cancel codes and other system symbols and to bypass job control based on these tests.

TSPS includes the ability to eliminate redundant JCL and facilitate reruns by conditionally triggering the restore of a backup data set after an abend. This is said to facilitate branching directly to the restart point in the job control.

The system requires no special library and works with card JCL, the DOS/VS(E) procedure library and Power SLI facility. TSPS runs with all releases of DOS/VSE and changes no IBM components, the vendor said.

A perpetual license for TSPS costs $4,500. Monthly and one- to three-year leases are available at costs ranging from $210 (month-to-month) to $100 (three-year lease) per month. Tower is located at 19782 MacArthur Blvd., Irvine, Calif. 92715.

CICS Users Gain Job Submit Module

ATLANTA — Software Concepts, Inc. has released a job submit module designed to provide CICS users with job submission capability.

Activated as a CICS task, the job submit module queries the user for job names and searches any user-defined partitioned data set for the appropriate member. The data is then retrieved, edited and submitted to an internal reader.

The job submit module is sold on a perpetual license basis for $950 from Software Concepts at 1450 Atlanta Center, 250 Piedmont Ave., N.E., Atlanta, Ga. 30308.

In fact, our latest conversational terminal is your opportunity for smart buying. That low quantity-one price—made possible by new manufacturing techniques—gives you a surprising list of standard features in a rugged, reliable terminal.

There are two very important facts you should know about this unit:

ITEM: Chat gives you switchable compatibility with the popular Lear ADM-3A and our own VC404, widely used throughout the world. So, you can expand your system economically without rewriting your software.

ITEM: In OEM quantities, Chat is easily modified to suit your requirements. And, of course, our low price goes much lower in quantity lots.

Look at Chat's standard features, starting with the 12-inch screen with anti-glare filter and the detached full keyboard, numeric pad with Enter key, cursor keys and 12 function keys.

You also get a 1920-character display with highlighting and 128 sharp, readable 7 x 9 dot-matrix characters. Transparent mode. A serial printer port. Fifteen data rates to 19.2k, with independently selectable transmit/receive speeds.

And Chat gives you options, too, like green or amber screens and foreign character sets.

Naturally, you'll want to know more. **Phone us toll-free at (800) 828-6543. In New York State, call collect (716) 475-1417.**

volker-craig inc.
333 Metro Park
Rochester, New York 14623
(716) 475-1221

See us and Chat at NCC, Booth 4612/13.

'Xpediter' Updated To Ease Testing, Debugging

SAN JOSE, Calif. — Application Development Systems, Inc. (ADS) here announced release of Version 1.3 of Xpediter, a software program that reportedly increases programmer productivity in testing and debugging.

Xpediter includes a compile processor, a structured testing language and a symbolic memory formatter. The compile processor captures data element attribute and location information from the output of the compiler.

This function permits the programmer to symbolically reference data elements, paragraph names and statement numbers without modification of source or object code, ADS said.

The structured testing language displays information before, during or after a test. It is said to remove the mechanical and clerical chores associated with testing and debugging activities.

When a programmer needs to see the value of an elementary or group item, all of working storage or the linkage sections or only those items that have changed, the symbolic memory formatter reportedly completes the request.

Xpediter supports the development or maintenance of Cobol, Fortran and Assembler language code programs or modules in IBM's IMS data base management system or in a non-IMS environment running under OS or OS/VS, ADS said.

The basic Xpediter system costs $25,000. IMS support is available for $5,000. Time-Sharing Option is available for $2,500, and Structured Programming Facility support is priced at $2,500 from ADS at 1530 Meridian Ave., San Jose, Calif. 95125.

Tool for Ebcdic Runs With Oasis

ST. LOUIS — A set of commands that will enable users of Phase One Systems, Inc.'s Oasis operating system to transfer files to and from IBM systems using Basic Exchange formatted diskettes has been announced by Design Systems, Inc. (DSI).

IBMXCHG, as the set of commands has been named, consists of four programs which run on Zilog Corp.'s Z80 microprocessor. The first initializes the exchange diskette. The second displays the directory of the exchange diskette.

A third program gets the Basic Exchange file and transfers it from the exchange diskette to the Oasis system. Throughout this process, the data is being translated from Ebcdic to Ascii format, the vendor said.

The fourth program takes the Oasis file and puts it onto the IBM format diskette. As the data is passed, it is converted from Ascii back to Ebcdic.

Each program is self-documenting, through use of a Help facility, DSI said. IBMXCHG is available at $75 for the set from DSI, P.O. Box 12243, St. Louis, Mo. 63157.

'Video-Text' Runs on 9700

DALLAS — A text-and-form composing system and compiler that run under IBM operating systems has been introduced by Computer Language Research, Inc. (CLR).

The software product, known as Video-Text, was designed for use exclusively with the Xerox Corp. 9700 office automation system, and according to CLR, offers advanced form composition capabilities with graphics, including diagonal lines, circles, pie charts and braces.

A compiler in the package is intended for compiling forms on the mainframe instead of on the 9700.

The system price is $45,000; the text application portion costs $25,000 from the vendor at 2395 Midway Road, Carrollton, Texas 75006.

System/38 Users Get Order Entry Package

ANN ARBOR, Mich. — A distributive software system that was designed for the IBM System/38 has been introduced by Louis A. Wright & Associates, Inc.

The system includes order entry, invoicing, accounts receivable, sales analysis and inventory control.

The DSS/38 package is priced between $20,000 and $30,000 from Suite 102, 496 W. Ann Arbor Trail, Plymouth, Mich. 48170.

Users Group Forming For Firms on CICS/VS

NEW YORK, N.Y. — A users group for companies that are now using or are planning to use IBM's CICS/VS as a data communications monitor has been formed by Telecommunications Technology Corp.

Further information on the CICS users group is available from Teltech, 548 Fifth Ave., New York, N.Y. 10036.

Programming System Targets CICS Under DOS

PITTSBURGH, Pa. — An on-line programming system for CICS users under DOS, DOS/VS or DOS/VSE operating systems has been announced by Westinghouse Electric Corp.'s operating software products department.

Scepter/CICS offers the capabilities of Scepter to customers currently using CICS in-house. Scepter will operate as a task under CICS control for all DOS, DOS/VS and DOS/VSE type operating systems.

Scepter was designed to operate using minimum data transfer in Display, Update and Catalog modes. The Display function is used to access any existing library system or any DOS, DOS/VS(E) system or private source and procedure libraries, Westinghouse said.

The Catalog function provides the capability of replacing existing or adding new members to the source or procedure libraries. In Update mode, Scepter provides maintenance functions that can be used to add statements to the library or edit statements.

Update mode also provides character string replacements; the capability to build, add or delete from modules; move statements within a module, from one module to another or from one library to another; resequencing of data after changes; and verification of changes.

Scepter also offers users the ability to interrogate spooler queues and submit jobs from the terminal. It has split screen display capabilities, color terminal support and multilevel security protection.

Scepter/CICS is priced at $6,000 and includes one year maintenance which is renewable for $700/year, the vendor said from 2040 Ardmore Blvd., Pittsburgh, Pa. 15221.

VAX® & PACS™

...team up to solve your problem of Resource Management and Chargeback.

Signal Technology's Process Accounting and Chargeback System (PACS):

- Satisfies in-house, commercial and government contract audit requirements.
- Reports use of all system resources to help optimize configuration and chargeback rates.
- Reports current charges to users on-line.
- NEW! Software packages and non-standard devices can now be accounted ... plus many other features...

*VAX is a registered trademark of Digital Equipment Corporation

For further information, contact
SIGNAL TECHNOLOGY, INC.
15 WEST DE LA GUERRA • SANTA BARBARA, CA 93101 • (805) 963-1552

pride® -ASDM

the world's only
commercially available
Automated Systems
Design Methodology

SYSTEMS DEVELOPMENT PRODUCTIVITY FOR THE 80's

For the first time, a proven Systems Design Method is implemented through the direct use of the computer. With "PRIDE"-ASDM, analysts and designers interact with the computer throughout the entire development process. "PRIDE"-ASDM CAN AUTOMATICALLY . . .

- Perform Computer Aided Design (CAD) & analysis for systems development.
- Generate & Maintain all systems documentation.
- Provide Information Resource Management (IRM).
- Monitor Business Systems Planning (BSP).
- Perform effective Quality Assurance (QA).

This advanced technology is available **today**. It is operational on IBM, Honeywell, Burroughs, Hewlett-Packard, Univac, DEC, ICL, CDC, and Amdahl configurations.

"PRIDE"-ASDM is the next logical step into your **future**; call or write us **today**.

M B A
m. bryce & associates, inc.
1248 Springfield Pike • Cincinnati, Ohio 45215
Tel: (513)761-8400 TWX: 810-461-2691 (M B A WYOG)
WITH OFFICES AROUND THE WORLD

Accounting System for HP 3000 Features Data Base Orientation

MINNEAPOLIS — A general accounting system for the Hewlett-Packard Co. 3000 was announced here by Analysts International Corp. (AIC).

Called Computer Data Information System (CDIS), the product features on-line, terminal-based, menu-driven data base orientation.

It includes general ledger, financial reporting, accounts receivable, accounts payable, project cost and payroll modules, which are integrated to the general ledger.

Multiple Companies

The system reportedly accommodates single or multiple companies and divisions. It provides definition of accounting periods and facilitates budget/forecast preparation for comparative reporting, AIC said.

Custom Definition

CDIS/3000 allows custom definition of the income statement and balance sheet and provides other reports, according to the vendor.

Security features, in addition to the formal security of the HP 3000 software, are also included, according to an AIC spokesman.

Written in Ansi Cobol, CDIS/3000 will operate on any HP 3000 computer under the MPE operating system with at least 512K bytes memory and 120M bytes disk capacity.

It uses HP block-mode terminals, an HP Image data base and the V/3000 screen format utility.

The system is priced by module: General ledger and project cost are available for $5,000 each; financial reporting costs $4,500; accounts receivable and accounts payable modules are priced at $9,500 each.

The payroll and labor distribution module is available for $12,500.

AIC is located at 11335 Ventura Blvd., Studio City, Calif. 91604.

Fortran Compiler Debuts

PALO ALTO, Calif. — With the addition of a Fortran 77/300 compiler, Hewlett-Packard Co. said its HP 300 computer now provides DP capabilities for executing Fortran business applications in technical and scientific environments.

The HP 300 offers both program code size of up to 2M bytes and data size to 64M bytes. When HP's remote job entry package (RJE/300) with Fortran 77/300 is used, programs may be transferred from large mainframes to the HP 300 for local processing.

For data base application designs, Fortran 77/300 interfaces with the HP 300's Image data base management system.

Fortran 77/300 includes the Fortran language monitor for entering, editing, running and debugging programs. Other features include an on-screen editor; commands for bulk copying, moving, changing and searching text; interactive error correction; and symbolic debugging.

Fortran 77/300 is available at a U.S. list price of $3,000 for one-time right to use. Additional copies cost $1,200. The HP 300 hardware starts at $35,000.

Current delivery estimates are four to eight weeks, the vendor said from 1507 Page Mill Road, Palo Alto, Calif. 94304.

Set of Six Applications Packages For HP 3000 Use 'Image'

FORT WASHINGTON, Pa. — Symcro Systems, Inc. has announced the availability of the Symcro Interactive Business System (Sibs), an integrated set of business applications software packages for the Hewlett-Packard Co. 3000 series computers.

The six packages that make up Sibs are general ledger, order processing, inventory management, accounts receivable, accounts payable and personnel/payroll. They are menu-driven, feature "forms-like" screen handling and interactive field editing for data entry, use HP's Image data base management system and can interface with various report generators to produce customized reports, the vendor said.

In Fortran

Sibs programs are written in Fortran and can be used on HP 3000 series equipment configurations ranging from the Model 30 to the Model 44. They can operate with any CRT terminal that is compatible with Teletype Corp. equipment, Symcro said.

The complete Sibs is priced at $35,000. The general ledger, accounts receivable, accounts payable and personnel/payroll packages can be purchased separately for $5,000 each. The order processing and inventory management packages are priced at $10,000 each.

Documentation consists of a detailed system specification and user's manual for each applications, the vendor said. Source code, installation and trailing by Symcro personnel are optionally available. The programs are fully warranted for one year, and Symcro offers a cross-licensing arrangement to HP OEMs.

Symcro is located at 200 Office Center, 275 Commerce Drive, Fort Washington, Pa. 19034.

• HDS • HDS • HDS • HDS • HDS •

Shopping For Software?
The Harris Data Service
"Shopping List" Has It All!

IBM System/3
IBM System/32
IBM System/34
IBM Series 1

Manufacturing Management Control Package
Dealer Order And Subscription Package For Publishers
Medical Clinic, Pharmacy & Dental Packages
Distribution Management System
F/A
P/R
A/P
A/R
G/L
"Many More Specialty Packages Available"

- On-Line & Batch
- Integrated
- Our Own Support Staff
- RPG II, EDX Support Staff
- 1st Time User Oriented
- Documentation
- Payment Terms

Call Our Software Information Hot Line Today (414) 475-1760 (Collect)

HARRIS DATA SERVICE, INC.
Milwaukee, WI • Richmond, VA • Clearwater, FL

• HDS • HDS • HDS • HDS • HDS •

TSO USERS!
THE
Applied Software
TSO/SUPERSET-UTILITIES
IS THE
BEST ALTERNATIVE
TO IBM

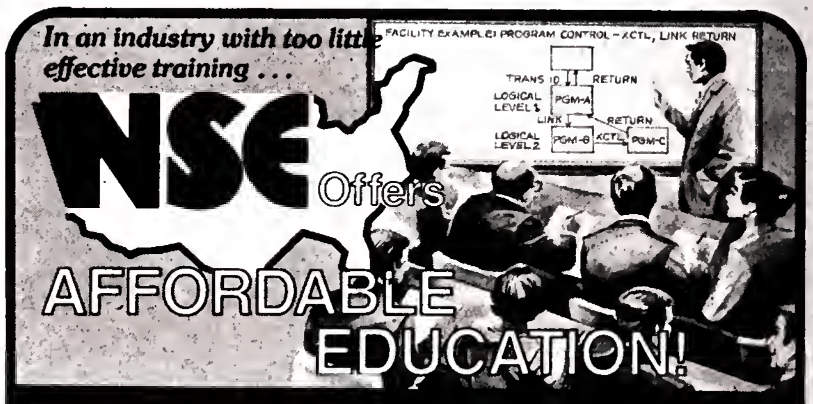
Compare:	Applied Software's TSO Superset Utilities	IBM'S TSO Data Data Utilities
Cost	$130 Installation	$144 CPU
Software Support	Class "A"	Class "C"
Full-Screen Support	Yes	No
132 Column CRT Support	Yes	No
LISTJES Command (SYSOUT Previewer)	Yes	No
TSOSORT Command	Yes	No
JTIP Interface	Yes	No
Fast Merge	Yes	No

WRITE OR CALL FOR FREE BROCHURE AND TECHNICAL COMPARISON
Applied Software, Inc.
4440 P.G.A. Boulevard, Suite 204
Palm Beach Gardens, Florida 33410
(305) 626-4818
OVER 300 TSO CUSTOMERS WORLD WIDE

THE TIME SAVERS
RPG to COBOL
or for those PL/1 Shops
RPG to PL/1

Two of the many **successful** translators offered by Dataware provide a smooth and effortless transition from RPG. The translators can handle most any level of RPG (SYS/3, Mod 20, etc.) and achieve an extremely high percentage of automatic conversion (approaching 100%) of the source code.

For more information please call or write today!
The Conversion Software People
Dataware, Inc.
2565 Elmwood Ave., Buffalo, NY 14217 (716) 876-8722
TELEX 91519



In an industry with too little effective training . . .
NSE Offers AFFORDABLE EDUCATION!

NSE's COURSES ARE SO COMPREHENSIVE OUR STUDENTS ARE PRODUCTIVE THE FIRST DAY BACK!

CICS/VS COMMAND LEVEL PROGRAMMING COURSE
NO. C120: 4 DAYS, $475.

May 4-7	Atlanta
June 1-4	Chicago

VSAM PROGRAMMING & STRUCTURE COURSE
NO. V100: 3 DAYS, $395.

April 27-29	San Francisco
May 18-20	Atlanta
June 24-26	Chicago

For more information mail coupon today!
NATIONAL SOFTWARE ENTERPRISES
EDUCATIONAL SERVICES DIVISION
310 W. Lake Street, Elmhurst, IL 60126 (312) 279-3836

NAME ____ COMPANY ____
ADDRESS ____ CITY ____ STATE ____ ZIP ____
AREA CODE/PHONE NUMBER ____
BEST TIME TO PHONE ME ____ AM ____ PM ____

Speed Sort Fits DG Minis

WINTER PARK, Fla. — Data-Tap, Inc. here is offering a speed sort for users of Data General Corp. and DG-compatible minicomputers using Information Processing, Inc.'s Blis/Cobol operating system.

The Data-Tap Speed Sort operates at speeds of up to 12,000 record/min, depending on the size of the record per file and the number of keys, the vendor said.

The record size may be from two to 512 characters and can contain a maximum of 16 keys with one to 512 bytes. Keys may be overlapping, ascending or descending. A select feature is included that allows for the selection of multiple values on a single pass per key.

The Data-Tap Speed Sort is priced at $3,000 in single quantities. The OEM price is $1,500, with discounts available on multiple copies, the vendor said from 900 Orange Ave., Winter Park, Fla. 32789.

WP System Fits LSI-11s, PDP-11s, VAX

SUDBURY, Mass. — A word processing system was announced here by EEC Systems, Inc. which reportedly can be used on all Digital Equipment Corp. LSI-11, PDP-11 and VAX computer systems using a standard video terminal and a letter-quality or matrix printer.

LEX-11 supports all DEC operating systems, including RT-11, RSX-11M, RSTS and VMS on the VAX, EEC said.

It uses the video screen to compose and edit text. LEX-11 includes document creating and editing facilities, as well as a calculator feature, a forms mode facility and full list processing features.

Menu-Driven System

The system is menu-driven and features a programmable video terminal interface. Automatic titling and page numbering are also provided.

LEX-11 was developed in England by ACE Microsystems, EEC said.

The cost of LEX-11 for systems running under DEC RT-11 and S&H Computers Time-Sharing Extension (TSX)-Plus operating systems is $2,500.

For systems running under DEC RSX11-M and RSTS, the cost is $5,000. The cost is $7,000 for VAX systems running under VMS.

EEC Systems is located at 315 Goodman's Hill Road, Sudbury, Mass. 01776.

Time Reporter Released

UCC Tracking System Monitors Job Status

DALLAS — Version 1.1 of the UCC Eleven automated rerun and tracking system, which features elapsed time reporting to provide pertinent information about jobs being tracked, has been released by University Computing Co. (UCC).

Included in the elapsed time reporting of UCC Eleven is the total clock time for a job to end successfully. The enhanced job status inquiry displays the last completed step for a currently executing job, thereby allowing the user to monitor job progress.

A new on-line command in Version 1.1 displays job restart information and shows the restartability status of jobs being handled by UCC Eleven. Historical information also will be displayed for each job, UCC said.

Another new on-line function displays step restart information for individual jobs, including last return code, condition code checks and the restart status.

Version 1.1 reportedly allows UCC Eleven to interface with UCC Three Automated Direct Access Management System to provide automated step retrieval of migrated data sets. Other features are a user-specified Sysgen option to indicate if a reason-for-rerun is required before a rerun can be executed and a conversion table to facilitate the entry of commonly used rerun reasons.

The price of the UCC Eleven system is $15,000; lease terms are available, the vendor said from UCC Tower Exchange Park, Dallas, Texas 75235.

TSI has a brilliant way to help auditors analyze data.

It's The Audit Analyzer. The most powerful auditing software you can buy. And the most flexible.

The Audit Analyzer is a complete auditing aid. It retrieves, analyzes, and presents the computer-stored information *you* want to see. In the form *you* want to see it.

At the same time, The Analyzer offers you complete independence in doing your job.

Its free-form language uses simple audit commands. Yet it's powerful enough to produce *any* report—from statistical analyses to data stratifications, sampling, cross tabulations, and graphic displays—without compromise. In as little as a single statement.

And unlike other packages, The Analyzer offers on-line capability. So you can conduct your audit from a terminal.

Result: whatever your data processing exposure, you can reach the information you need. Using whichever computer auditing techniques you want. Independently. With considerable savings in time and money. And in harmony with your data processing department.

No other system offers so much.

For more illuminating information about The Audit Analyzer, call (203) 853-2884 for the number of our office nearest you. Or send your business card and this ad to TSI International, 50 Washington St., Norwalk, CT 06854.

Hardworking software that's easy to use.

National CSS
a company of The Dun & Bradstreet Corporation

TSI International
System Products Division
50 Washington St., Norwalk, CT 06854

Multiuser System Runs Under Unix for Suppliers

WESTFORD, Mass. — A multiuser, multitasking software system running under Bell Laboratories' Unix operating system for distributors of industrial supplies is available from American Business Systems, Inc.

Written in Ryan McFarland, Inc. (RM) Cobol, the distribution system consists of order entry/inventory control and accounts receivable modules functioning interactively.

The order entry module enables companies to generate their own purchase orders and then maintains the purchase order file. It also maintains back orders for customers and vendors and has an automatic quantity reserve, the vendor claimed.

The module can support up to 90 items per order. It has a trial run capability for invoices. Reports available are open order, back order and price exception, the vendor said.

The accounts receivable module prepares statements which can include sales cash and adjusted journals, credit balances only or delayed accounts only.

The distribution system will be available by May through American Business Systems' network of dealers and distributors for a retail price that will run under $10,000, the vendor said from 439 Littleton Road, Westford, Mass. 01886.

Jyacc Utility Offered For TI DS990s Under DX10

NEW YORK — A utility package for use on Texas Instruments, Inc. DS990 equipment running under the DX10 operating system has been developed by Jyacc, Inc.

Aide consists of utilities for library maintenance, text editing, language independent compile and link edit, showing and printing source listing and linkmap and automatic copy file management.

It also includes utilities for program outline generation, continuous display of name and pedigree of the program currently active in the programmer's work directory, common libraries, local libraries and mandatory documentation.

Languages supported by Aide include Cobol, Fortran, TI990 Macroassembler, Pascal TIForm 990, DBMS990 and TI's SCI Program Control Language.

Jyacc is marketing Aide to other TI users for $1,600, which includes the utility package on a 5M-byte disk pack, installation and operator instruction manuals and a hot-line service for questions about Aide.

The vendor is located at 310 Madison Ave., New York, N.Y. 10017.

'GRS' Designed For Data Bases

NEW YORK — Enterprise Technology Corp. here announced the Generalized Reporting System (GRS), an on-line data base query and report writing language designed for use with a variety of data base systems and file access methods.

GRS currently is operational on the Digital Equipment Corp. PDP-11 computer under RSTS/E. A version for full-size IBM and compatible computers is under development.

It consists of an English-like query language which reportedly is structured to facilitate use by management and systems personnel. It includes a wide range of defaults, summarization statements and a set of built-in calculations.

The user can supply titles, headings and page footers. Several different files, record formats and/or print line formats can be incorporated into a single report.

GRS includes an on-line user Help facility and optional password protection at the individual field level. Users can save sets of commonly used GRS commands in macro command files.

Additional GRS features include sorting of the input data and output reports; control breaks with totalling, weighted averages and other summary calculations; table lookups; elementary statistical analysis; and random sampling.

The user can enter specialized calculations in standard algebraic format. The results can be used to create new, temporary data base fields or to temporarily redefine existing fields.

GRS operates on most types of interactive terminals, both CRT and hard copy.

The GRS software is supplied under a perpetual license for a fee of $12,000, which includes documentation and one year of support. Training and customization services also are available.

Enterprise Technology Corp. is located at 305 Madison Ave., New York, N.Y. 10165.

Cost Estimating Added To RCA 'Price S'

CHERRY HILL, N.J. — RCA has announced the availability of life-cycle cost estimating for users of its Programmed Review of Information for Costing and Evaluation (Price) S software model.

Price SL is available to Price S users at no additional charge from RCA, Building 206-1, Rt. 38, Cherry Hill, N.J. 08358.

Model 204 DBMS.
A perfect 4!

Bull's eye! The leading software rating service gives Model 204 DBMS a perfect score – 4 out of 4 – for ease of use.

Because with Model 204 it's easy. It's easy to learn. Easy to install. Easy to set up new databases. And easy to develop new applications – for inventory control, personnel data, financial applications, correspondence tracking, project control – and every other kind of corporate database.

And since it's easy, it doesn't require teams of programmers. And it doesn't take years. Which means cost savings on a large scale.

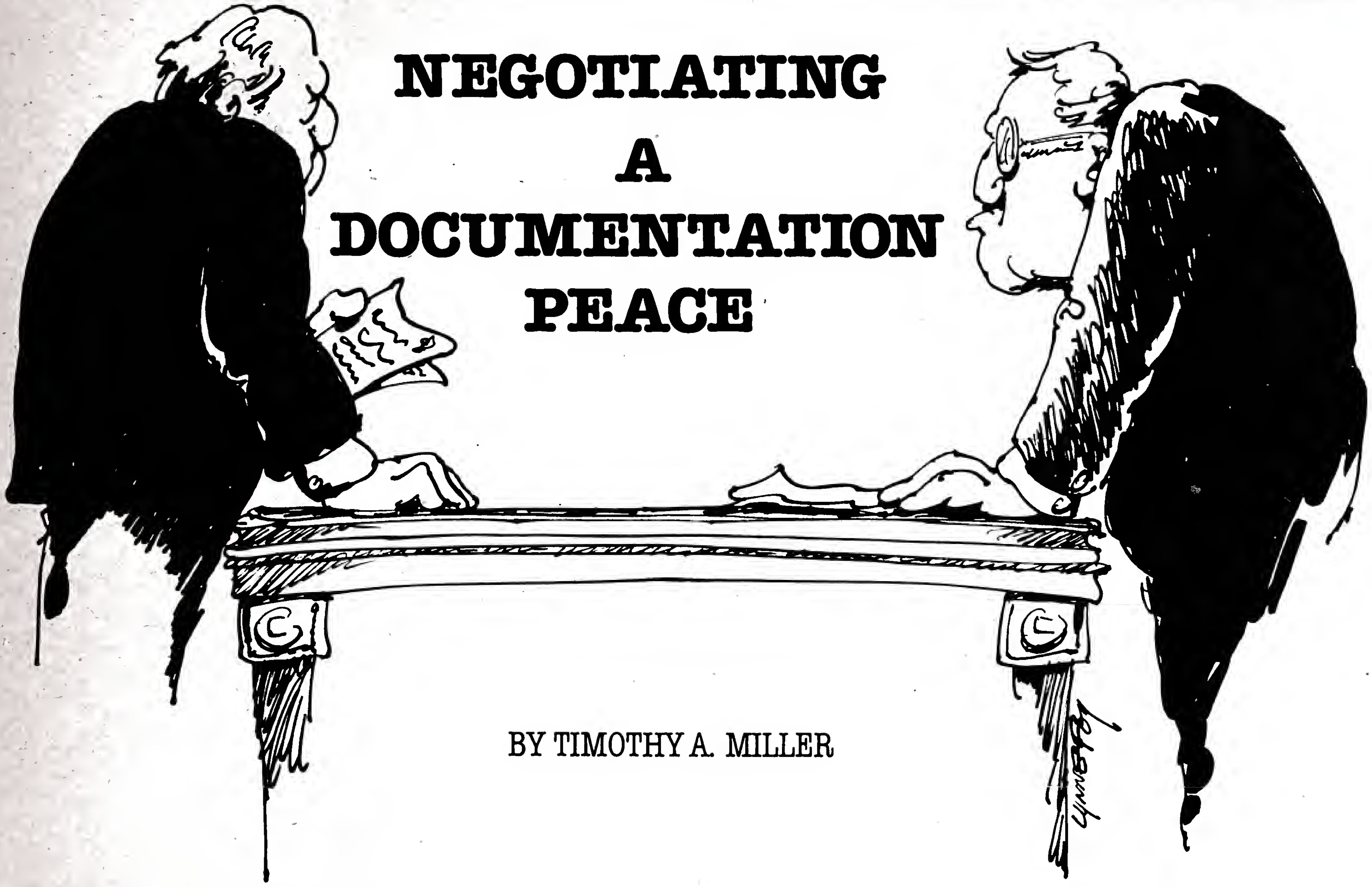
If you want to find out how some of America's largest corporations solve their DBMS problems with Model 204, clip your card to this ad and send it to us. It's easy!

Computer Corporation of America, 675 Massachusetts Avenue, Cambridge, MA 02139. Or call 617-491-7400.

Model 204

Computer Corporation of America

Cambridge, New York, Houston, San Francisco, Chicago, Washington/Affiliates: Tokyo, Berne, Milan, Toronto.



NEGOTIATING A DOCUMENTATION PEACE

BY TIMOTHY A. MILLER

In confrontations between systems development and systems maintenance, which at times seem only slightly less severe than an international border war, whole application systems are often held hostage from implementation.

After years of pressure tactics attempting to resolve the conflict, the time has come to negotiate a peace between the development and maintenance empires of the data processing world.

Typically, the bone of contention between development and maintenance is the technical documentation to be provided with a system. In this context, technical documentation is that material in excess of program listings whose purpose is the support of a given application system's maintenance. Program listings are not considered documentation since, in essence, they are what is being maintained and their presence is accepted by all parties.

No Surprise

Because of the administrative and budgetary separation of development and maintenance that is promoted by most current system methodologies, the conflict over documentation is no surprise. One area's work is the other area's savings.

Since the preparation of documentation is part of the development responsibility, maintenance has nothing to lose from holding out and lobbying for as much documentation as possible. Development, on the other hand, has nothing to gain from providing more documentation than is necessary to get the system implemented. Caught in the middle is the system user whose budget not only pays for both sides to argue but also is ignored in the resolution.

In an effort to end the recurring confrontations, standards committees have been formed to specify the level of documentation to be expected from all systems. As is unfortunately the case with most similar committees, documentation standards committees need to justify their own existence by publishing original material with tangible and quantitative features that may be regulated.

There is usually nothing in the committee charters, however, requiring cost-effectiveness for the standards. The result is that the standards specify form and volume, requiring increasing amounts of detail in an attempt to ensure coverage for every possible scenario of necessary maintenance. Technical documentation thus becomes an end unto itself with a dogma that equates details and style with excellence beyond cost.

The costs of complying with the documentation standards often go unnoticed because the preparation of the material is incorporated within the general development tasks for the system. More than one manager has come to a rude awakening, however, upon seeing the cost estimates of an after-market documentation project surpass the expected maintenance budget and approach the initial cost of developing the system.

Caught between the absolutes of the documentation dogma and the costs of the project, the manager rightfully feels betrayed and defensive. For this reason, vendors dealing in after-market documentation are starting to talk to clients in terms of cost-justification studies and negotiated levels of documentation as part of estimating a project.

Four Premises

The study and negotiations are based upon four seemingly obvious premises:

1. No technical documentation is necessary. First and foremost, technical documentation is not an absolute necessity for an application system.

Maintenance personnel are amazing detectives in their ability to find and correct system problems. History has shown that with only program listings, systems may be adequately maintained.

In addition, when a system is documented after implementation, the person preparing the material is using nothing more than that which is available to maintenance before documentation.

Technical documentation is a form of insurance. The premium of the policy is the time and money spent in preparing and maintaining the material and the benefits are the expected time and money saved in accurately maintaining the system. One manifestation of these benefits is the reduction of the "migrating bug syndrome" in performing system maintenance.

2. Documentation needs vary with types of maintenance. Continuing with the insurance analogy, documentation provides a coverage package.

System abends, input and output modifications and processing adaptations and enhancements require different components of documentation just as fire, flood and vandalism need different clauses in a building's insurance policy.

For system abends, coverage may require explanations of error codes and messages, data requirements and constraints and maps of program and data flows. (An attempt is being made here to use terms that are generally descriptive without being buzzwords or promoting any specific methodology.)

The process of modifying input and output may benefit from data layouts, data requirements and constraints and maps of data flow.

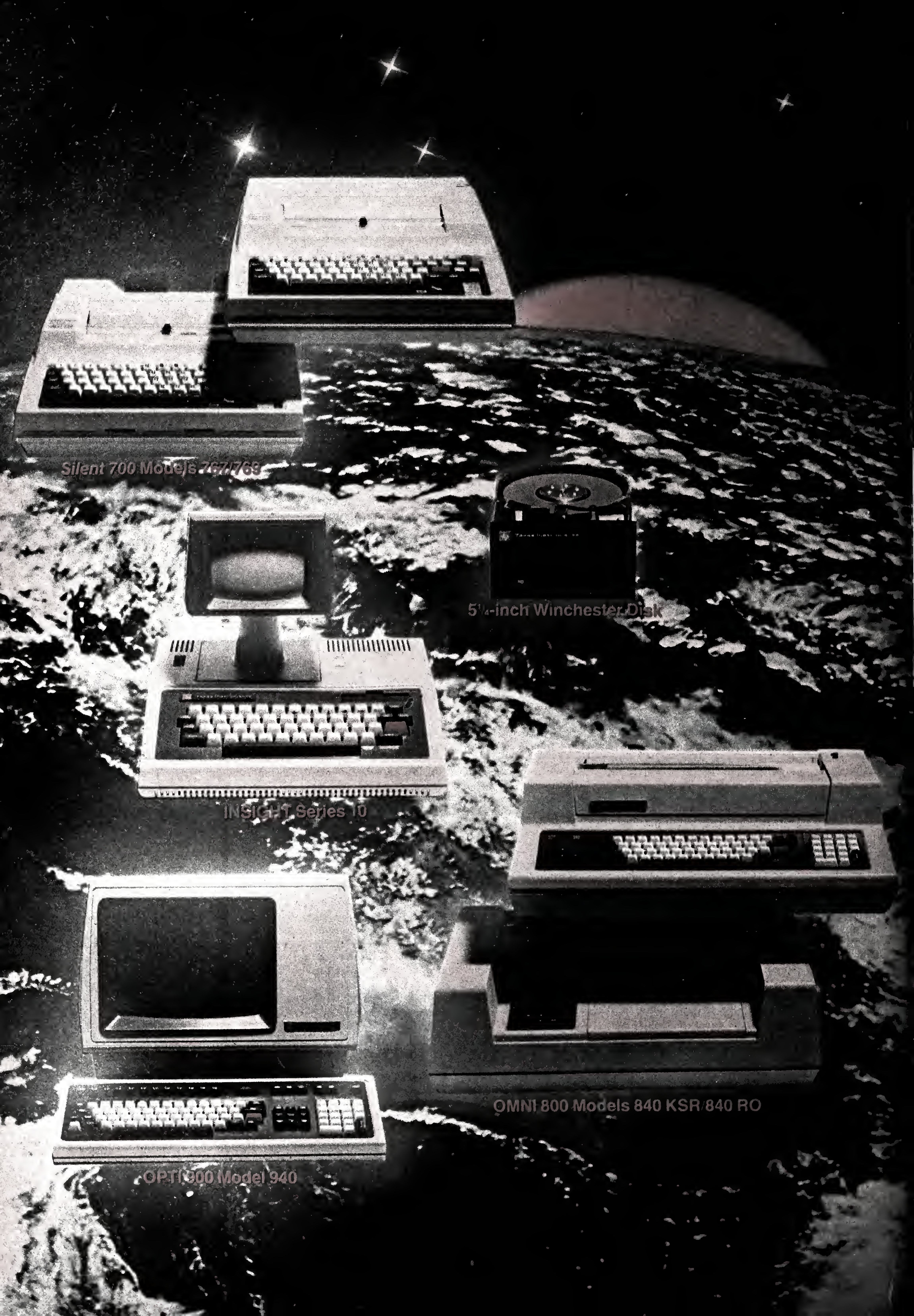
In enhancing or adapting processes, descriptions and flows of the system, subsystems, programs and data all may be used to varying degrees.

Although providing coverage for all kinds of maintenance contingencies to every section of a system may be comforting to a manager, preparing certain documentation components for some systems is similar to insuring against flood damage in a desert. There are systems or subsystems for which there is a negligible chance that the input or the output may need modification or that the processing may be enhanced. For such systems and subsystems, one or more documentation components may be superfluous.

3. Some system techniques are self-documenting. One of the attributes of higher level programming languages is that with disciplined use, they may be self-documenting.

Conscientious file and data declarations and naming conventions can reduce the requirements for separate file and record layouts and data descriptions. Modular design and structured programming can produce obvious program flows. In addition,

(Continued on In Depth/6)


Silent 700 Models 767/769
5¼-inch Winchester Disk
INSIGHT Series 10
OMNI 800 Models 840 KSR/840 RO
OPTI 900 Model 940

No Postage
Necessary
If Mailed
In The
United States

BUSINESS REPLY MAIL

First Class Permit No. 2822 Dallas, Texas

Postage Will Be Paid By Addressee

TEXAS INSTRUMENTS INCORPORATED
Digital Systems Group
P.O. Box 202145
Dallas, Texas 75220

No Postage
Necessary
If Mailed
In The
United States

BUSINESS REPLY MAIL
First Class Permit No. 2822 Dallas, Texas

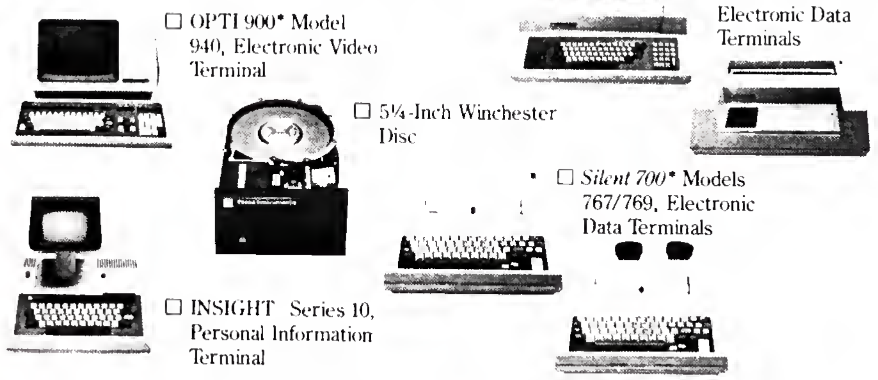
Postage Will Be Paid By Addressee

TEXAS INSTRUMENTS INCORPORATED
Digital Systems Group
P.O. Box 202145
Dallas, Texas 75220

Individual Name
Title
Company Name
Address
City State Zip Code
Phone ( )

☐ Please have a sales representative contact me.

Please send me more information on:



☐ OPTI 900* Model 940, Electronic Video Terminal

☐ OMNI 800* Models 840 KSR/840 RO, Electronic Data Terminals

☐ 5¼-Inch Winchester Disc

☐ *Silent 700** Models 767/769, Electronic Data Terminals

☐ INSIGHT Series 10, Personal Information Terminal

My main business is: ☐ OEM ☐ End User ☐ Distributor
☐ Other

My industry is: (Check the industry which best categorizes your business)
- ☐ Construction-Contractors
- ☐ Printing-Publishing
- ☐ Petroleum-Chemical Products
- ☐ Machinery-Except Electrical
- ☐ Transportation Equipment
- ☐ Communications
- ☐ Wholesale Trade-Durable Goods
- ☐ Airline Industry
- ☐ Electrical/Electronic Equipment
- ☐ Automotive Industry
- ☐ Health Services
- ☐ Retail
- ☐ Banking Services
- ☐ Insurance Services
- ☐ Real Estate Services
- ☐ Business Services
- ☐ Educational Services
- ☐ Government Services
- ☐ Other

My SIC Code is

☐ I currently use TI Terminal products.

Computerworld WS-05

*Trademark of Texas Instruments

TEXAS INSTRUMENTS
INCORPORATED

Individual Name
Title
Company Name
Address
City State Zip Code
Phone ( )

☐ Please have a sales representative contact me.

Please send me more information on:

☐ OPTI 900* Model 940, Electronic Video Terminal

☐ OMNI 800* Models 840 KSR/840 RO, Electronic Data Terminals

☐ 5¼-Inch Winchester Disc

☐ *Silent 700** Models 767/769, Electronic Data Terminals

☐ INSIGHT Series 10, Personal Information Terminal

My main business is: ☐ OEM ☐ End User ☐ Distributor
☐ Other

My industry is: (Check the industry which best categorizes your business)
- ☐ Construction-Contractors
- ☐ Printing-Publishing
- ☐ Petroleum-Chemical Products
- ☐ Machinery-Except Electrical
- ☐ Transportation Equipment
- ☐ Communications
- ☐ Wholesale Trade-Durable Goods
- ☐ Airline Industry
- ☐ Electrical/Electronic Equipment
- ☐ Automotive Industry
- ☐ Health Services
- ☐ Retail
- ☐ Banking Services
- ☐ Insurance Services
- ☐ Real Estate Services
- ☐ Business Services
- ☐ Educational Services
- ☐ Government Services
- ☐ Other

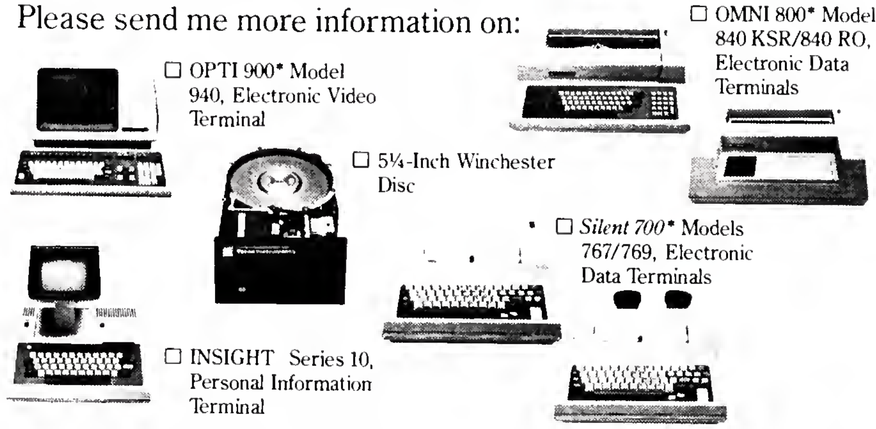
My SIC Code is

☐ I currently use TI Terminal products.

Computerworld WS-05

*Trademark of Texas Instruments

TEXAS INSTRUMENTS
INCORPORATED



The best of both worlds.

Announcing TI's new Silent 700 Models 767 and 769 Electronic Data Terminals.

TI's new *Silent 700** Model 767 and 769 Electronic Data Terminals combine the field-proven reliability of nonvolatile bubble memory with excellent data integrity at an affordable price. Both models feature 3780 protocol for error-free communications and Data Entry Validation for data input reliability. For network needs, TI also offers modems and a poller software application package. Reliable bubble memory and powerful communications, the best of both worlds from Texas Instruments.

See what the future has in store for you.

The future is now accessible. Introducing the new 5¼-inch Winchester Disk from Texas Instruments. This 6.38 Mbyte disk drive featuring Winchester technology and minifloppy mounting dimensions allows easy system integration and provides high reliability, performance and capacity all in a small package. Low cost, reliable performance. That's what Texas Instruments has in store for you.

Innovation comes into view.

Information retrieval enters a personal dimension with the new INSIGHT Series 10 Personal Information Terminal from Texas Instruments. The Series 10 can provide low-cost personal access to commercial information databanks to bring you current information on areas including finance, economics, credit verification, engineering, agriculture and more. INSIGHT Series 10 can also provide quick, easy access to internal computer databases and offer a new dimension in interoffice communications. Innovation, up close and personal.

An announcement of universal impact.

Meet TI's new OMNI 800* Model 840 Keyboard Send-Receive Data Terminal and Model 840 Receive-Only Printer. Both basic 840 Models are friction-feed, low-speed impact data terminals combining 75 character-per-second printing with the field-proven reliability of the Texas Instruments OMNI 800 family.

Both are well suited for remote and local telecommunications and printing requirements, inquiry/response and data entry/logging systems applications. Innovation with universal impact.

A powerful display of innovative thinking.

Introducing the OPTI 900* Model 940, the first in a family of Electronic Video Terminals from Texas Instruments. The new Model 940 combines the power of an editing terminal with the convenience of video display to bring new functionality to a wide range of user applications. The Model 940 is engineered for ease of operation to meet the operator environmental demands of the 80's. Displaying both contemporary and functional office styling, innovation has never looked so good.

For more information send in the attached reply card, contact the TI sales office nearest you or write Texas Instruments Incorporated, P.O. Box 202145, Dallas, Texas 75220, or phone (713) 373-1050.

We put computing within everyone's reach.

TEXAS INSTRUMENTS
INCORPORATED

In Canada, write Texas Instruments Incorporated, 41 Shelley Rd., Richmond Hill, Ontario L4C 5G4, (416) 884-9181. In Europe, write Texas Instruments, M/S 74, B.P. 5, Villeneuve-Loubet, 06270, France, (93) 20 01 01. In Asia Pacific, write Texas Instruments Asia Ltd., 990 Bendeemer Rd., Singapore 1233. Telex RS 21399, or phone 2581122.

*Trademarks of Texas Instruments Copyright © 1981, Texas Instruments Incorporated

(Continued from In Depth/1)

narrative abstracts of programs and routines can be embedded within the program listing.

Other techniques also lessen the benefits that may come from separate documentation. Error code displays may include descriptions and locations of the error. Each output may specify the program module that produced it. Program designations themselves may indicate subsystems and system flow.

These techniques are not applicable to all systems and do require discipline to use consistently. When these and other similar techniques are consistently used, however, standards for separate technical documentation result in exercises of redundancy that penalize the development personnel.

4. Documentation must be functional in creation, maintenance and use. Technical documentation is a collection of working documents and, as such, should be easy to create, maintain and use. Through the evolution of documentation, however, more emphasis has been placed on the requirement for a "professional" look than on any requirements for human engineering.

By current standards, all forms, tables, charts and narratives are typed. All spaces on each form and table are completed, no matter how trivial the entry.

Narratives are written in term-paper form with each paragraph requiring a separate opening or transitional sentence, one or more descriptive sentences and a separate closing sentence or conclusion. All exhibits of input forms, reports and screens, file and record layouts, and data descriptions are grouped into appendixes. Finally, the documentation is maintained by use of typed appendixes.

Typing is at best a mixed blessing. Although typed material may be more legible than some examples of handwriting, if a typist going at production speed can read the original handwriting, then so should a person reading for comprehension.

Typed material also has an inhibiting effect on the preparation and maintenance of documentation. Besides the additional time and cost of the typists, there are ingrained beliefs that anything typed is sacred. For this reason, preparation is not started until the system is finished and all data is absolute so that the material will be complete and correct the first time it is submitted.

In addition, maintenance is only performed on the documentation to reflect major system modifications, and these changes are applied through the use of addenda. As a result, the documentation delays the system's final implementation and then is nickel-and-dimed into obsolescence by multiple small changes.

Users Get Lost

State-of-the-art documentation is also inconvenient to use. The separation of documentation from program listings, the grouping of exhibits into appendixes and the use of maintenance addenda may make it difficult for a person to get access to all of the pertinent material and then keep his place in the various components while trying to correlate the information.

While minute details and completed blanks may satisfy a person's curiosity and indicate thoroughness, trivial data that is irrelevant to any actual maintenance procedure may obscure other data that is important. Similarly, lengthy narratives are difficult and time-consuming to scan for desired information.

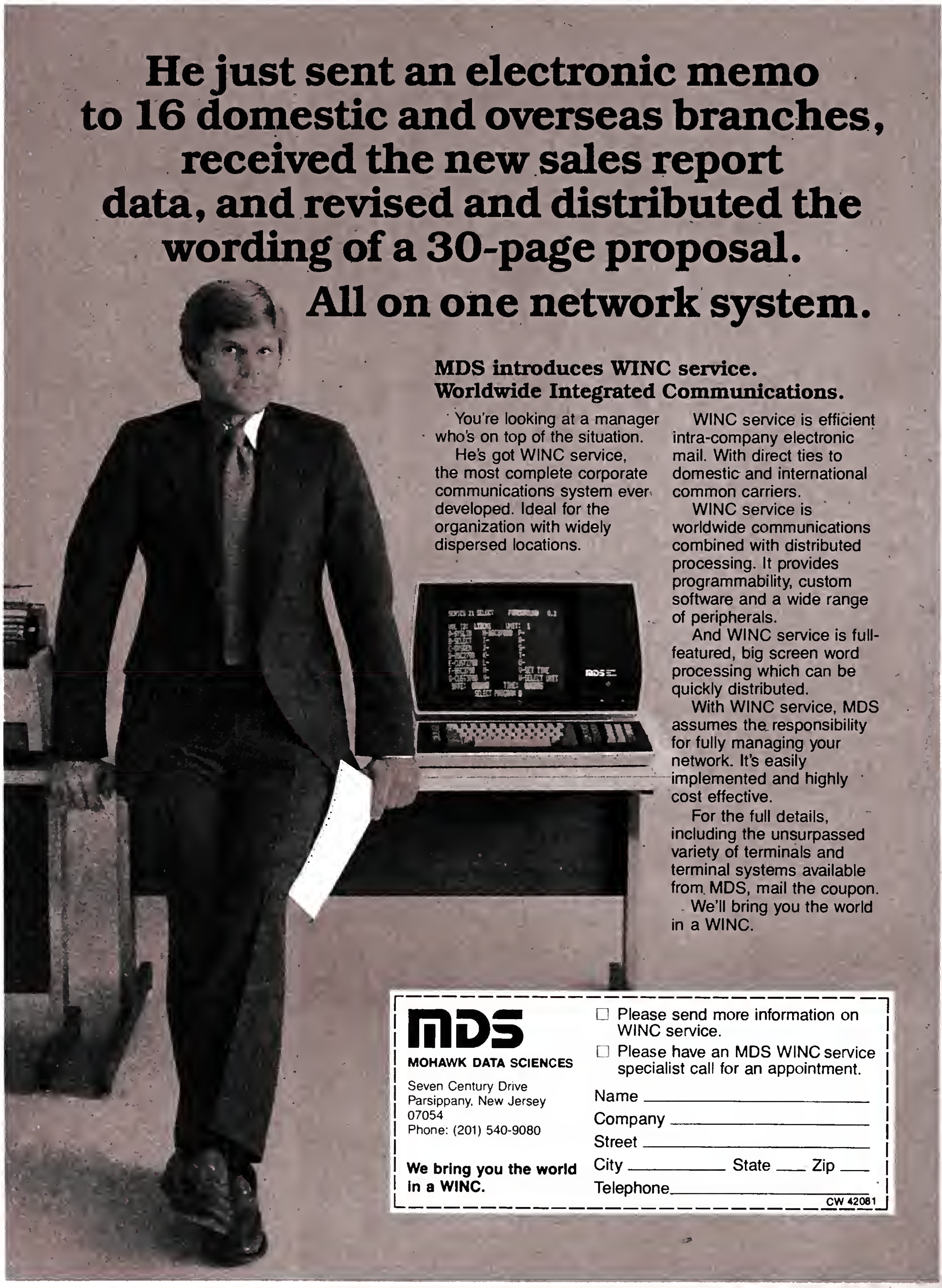
In addition to these premises, the cost-justification study and negotiation use a commodity called "expected net benefit" (ENB).

The ENB is calculated for each documentation component as the difference between the expected cost savings from having the component's information available and the expected cost of creating and maintaining the component. A positive ENB indicates a piece of documentation that is cost-justified, and the value of the ENB provides the basis for negotiating different techniques for preparing the documentation.

There are four major steps in performing the study and negotiations:

1. **Determine the kinds of mainte-**

(Continued on In Depth/8)


He just sent an electronic memo to 16 domestic and overseas branches, received the new sales report data, and revised and distributed the wording of a 30-page proposal.
All on one network system.

MDS introduces WINC service.
Worldwide Integrated Communications.

You're looking at a manager who's on top of the situation. He's got WINC service, the most complete corporate communications system ever developed. Ideal for the organization with widely dispersed locations.

WINC service is efficient intra-company electronic mail. With direct ties to domestic and international common carriers.

WINC service is worldwide communications combined with distributed processing. It provides programmability, custom software and a wide range of peripherals.

And WINC service is full-featured, big screen word processing which can be quickly distributed.

With WINC service, MDS assumes the responsibility for fully managing your network. It's easily implemented and highly cost effective.

For the full details, including the unsurpassed variety of terminals and terminal systems available from MDS, mail the coupon.

We'll bring you the world in a WINC.

MDS
MOHAWK DATA SCIENCES
Seven Century Drive
Parsippany, New Jersey
07054
Phone: (201) 540-9080

We bring you the world in a WINC.

☐ Please send more information on WINC service.
☐ Please have an MDS WINC service specialist call for an appointment.

Name ____
Company ____
Street ____
City ____ State ____ Zip ____
Telephone ____

CW 42081

Memorex re-defines your options.

Maybe you didn't know we had such a large family of display stations, controllers, transmission control units and printers.

Well, there's something else you might not know about the Memorex Communications product family. All of our family members not only work with one another, they also perform well with the equipment you might already have.

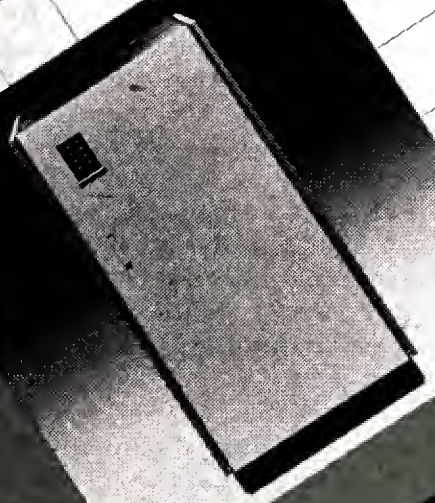
It's this unique flexibility that dramatically increases your options.

Of course, every product in the Memorex Communications family has certain common characteristics that are always high on your list of data-processing priorities. Like proven performance that has been both recognized and accepted world wide. Products carefully engineered to help assure operator comfort and improve their productivity and accuracy. Consistent track records of quality, availability and service. Plus cost effectiveness made possible through energy and power-saving features.

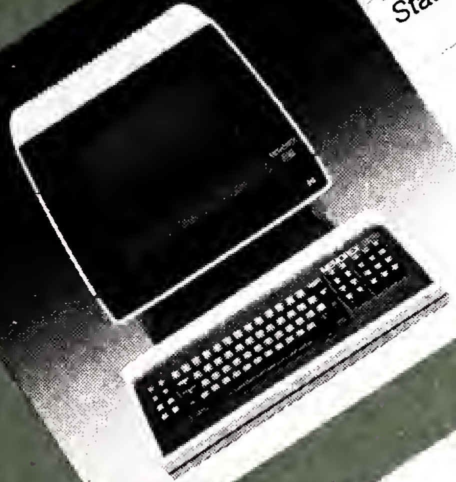
So, when you consider acquiring display stations, controllers, transmission control units and printers—consider the options. For all the specifics on every member of the Memorex family, call Laurie Schuler at (408) 996-9000. Or write Memorex Communications, 18922 Forge Drive, Cupertino, California 95014.

1270 Transmission Control Unit

2089 Line Printer



1380 Communications Processor



2078 Display Station

2087 Matrix Printer

1300 Screen Printer

1377 Display Station

2076 Remote Cluster Controller

(Products not shown to scale.)

MEMOREX

TWENTY YEARS OF LEADERSHIP AND THE EDGE ON TOMORROW.

© 1981 Memorex Corporation.
Memorex is a registered trademark of Memorex Corporation.

(Continued from In Depth/6)

nance to which the system is susceptible and weigh the probabilities of their occurrence.

Discussions with the system's users and development personnel should identify areas of possible planned maintenance for the system. Included within the planned maintenance are all items on the users' "wish lists" that are still outstanding when the system is implemented.

Similarly, discussions with maintenance and operations personnel should provide information on the kinds of emergency maintenance that may be expected from a system.

Besides identifying the kinds and numbers of items that are possible for maintenance, the probability of actual occurrence may be estimated for each item. The probabilities are used as weighting factors in the calculations of expected cost.

Expressed in decimal, the probabilities fall into five categories:

1.00 - Definite
.75 - Probable
.50 - Possible
.25 - Unlikely
.10 - Negligible

2. Estimate the expected savings in performing the maintenance using documentation that is not already available.

The system is analyzed from the viewpoint of performing all of the planned and emergency maintenance. Cost estimates are made first for maintaining the system with only the material that is already available.

At the same time, additional documentation that would ease specific maintenance tasks is identified by the kinds of information needed.

Cost estimates are then made for performing the maintenance using the supplemental material. Each estimate is weighted by the appropriate probability of occurrence. The difference between the two sets of weighted estimates is the expected cost savings from having all of the additional documentation. The savings is then prorated over the individual documentation components that were requested.

3. Estimate the expected cost of creating and maintaining the requested additional documentation.

For each additional documentation component that has been requested, various techniques are studied to determine the easiest method for creating and maintaining the required information within the framework of the system. Both the cost of producing the material and the expected cost of maintaining it are then estimated.

4. Negotiate any refinements to the techniques of documentation.

The difference in the cost estimates of steps 2 and 3 is the maximum theoretical ENB for each of the documentation components.

Those components with a zero or negative ENB may be discarded outright. For the remaining components, the development and maintenance departments have a basis for negotiating actual usefulness vs. ease of preparation and maintenance of the documentation.

As with any planning function, the study and negotiations do add overhead to the cost of a project. The first step, however, should not require more than one-half day each for the discussions with the development, maintenance and operations areas and each independent user group.

Likewise, in order to prevent going overboard, no more than one-half hour should be spent in reviewing the system for any given maintenance tasks.

Series of Benefits

Offsetting the cost, the procedure provides a series of benefits:

- Development personnel are given incentive to produce a system with maintenance considerations that will limit the time they have to spend preparing separate documentation.
- Maintenance personnel are given the basis for anticipating both planned and emergency items.
- Documentation costs are limited to those for which there are expected justifications.
- Finally, a data base is developed in which future actual costs may be compared with what was expected.

Timothy A. Miller is the principal of TAM Systems Consulting, Staten Island, N.Y.

Computers Designed for the Professional

Billings Computer Division designs and supports a complete line of computer systems for the professional user which includes an impressive library of professional applications software.

WORD/FORMS PROCESSOR PACK is a screen oriented context editor featuring word underlining, variable line spacing, right margin justification, proportional pitch, block moves, search and replace, column alignment, super- and subscripting, plus many others.

BOOKKEEPER SERIES ACCOUNTING PACK includes Payroll, Accounts Payable, Accounts Receivable, and General Ledger. Easily tailored reports make this a very versatile package designed to meet the needs of a wide variety of businesses.

LEGAL ACCOUNTING PACK is a complete cash accounting system including Fees Manager, Cash Receipts, Statements, and Check Manager. Payroll and General Ledger from Bookkeeper series also are compatible.

INVENTORY MANAGEMENT PACK is a powerful manufacturing inventory package designed to eliminate parts shortages and overstocking. Ordering and expediting reports are generated from a 52-week production schedule. Cost calculations are made for up to 19 different models.

SCREEN ASIST PACK is a program development tool which simplifies the formatting of information on the CRT screen. A special editor allows the creation of a template with protected and unprotected fields.

FORTRAN PACK includes all of the normal features plus special subroutines to allow enhanced file access and manipulation, sorting, use of screen ASIST, and many others. Overlay capability allows development of many programs normally too large for a small computer.

BASIC PACK has both EBasic for fast Basic applications and BBasic for applications requiring capabilities not normally available to Basic users, such as indexed files, structured "if-then-else" statements, Trace debug feature, formatted input and output, and others.

COBOL PACK is an ANSI 1974 version with many level two features plus the same enhancements as the FORTRAN PACK.

Billings
18600 E. 37th Terrace
Independence, MO 64057
(816) 373-0000

☐ Please send information on becoming a Billings Dealer.

Name ____________
Company ____________
Title ________ Phone ( ) ________
Address ____________
City ________ State ________ Zip ________
CW 4/20

Designing Computer Models That Work

by Martin R. Collins and John M. MacGregor

Financial modeling techniques are becoming more popular and accepted as a useful information processing tool. But what is financial modeling, and does the term adequately describe current applications?

Why has financial modeling been such a growth area, and what are the benefits? Given a desire to build models, where does the manager begin? What type of system and language should be used and by whom? What type of computing facility is most suitable?

Modeling: A Definition

A model is an attempt to represent reality. A good example would be an architect's model of a building. A financial model is therefore a representation of a financial structure in which a company's operations of procurement, production and selling are represented in financial terms.

J.S. Hammond III, in "Do's and Don'ts of Computer Models for Planning" (*Harvard Business Review*, March-April 1974), wrote: "Computer planning models are computer-based representations of all or part of a company's current or prospective operations or of its economic environment, or both."

The representation can vary in complexity, but is most likely to be closely analogous to accounting statements, incorporating such items as revenues, costs, contributions, expenses and profit. Financial models are constructed from relationships between these quantifiable factors. Data values supplied by certain of these factors are often referred to as input variables. The data provided typically concerns forecasts for a specified period. The relationships in the model are often referred to as the model's logic.

While many relationships are simple, some models contain more complex relationships. Examples might include conditional tests (to check sales with capacity levels) or moving data between columns (to represent delays in tax payment). All financial modeling systems — and a great variety are currently available — are capable of handling simple applications. However, only a small proportion can handle the more complex requirements often encountered in practice.

The large number of modeling systems and languages now on the market have institutionalized the term financial modeling, although many models include physical factors such as manpower and production capacity. Therefore, it seems that financial modeling is something of a misnomer and perhaps a better term would be *resource modeling*, although the vast majority of models will eventually interpret the calculation into a financial statement.

Computers haven't been mentioned so far, and although a manually prepared budget is itself based on a model of the organization, it may not be as explicitly stated as a computer model. However, the speed with which a computer can process calculations, enabling many more options to be evaluated or complete plans to be recalculated quickly, means that financial modeling is invariably associated with some form of computerization.

Putting Models to Work

Most models are classified by the application areas they serve. Some models are concerned with the company and its environment, while others deal with budgets and five-year plans. Specialized models are used for investment appraisal, manpower planning and other ad hoc applications.

Another way to classify models is by the three areas of their major use: financial — incorporating financial planning, cash flow analysis and financing; nonfinancial planning — where models are used to aid marketing and production decisions; and finally models used for the evaluation of special projects such as new ventures and acquisitions.

Some experts divide applications into strategic — used to evaluate alternative courses of action; impact — used to provide a rapid calculation of the effect of environmental changes; budgeting; planning — an extension of budgeting models; and cash-flow forecasting.

The sheer range of application areas gives an idea of the various uses of financial models. Therefore, we generally classify models concerned with:

Short term — typically budgetary planning and control.

Long term — the five-year plan, or even 30-year plan.

Specialized applications — evaluation of capital investment, acquisition appraisal, manpower and production planning.

Models concerned with the short term generally contain large amounts of data, while models concerned with the long term generally have less data and their logic, or relationships between variables, may be less precise. Specialized applications may contain both characteristics.

As with most tools, modeling's substantial benefits are tempered by the limitations of financial models. As we stated at the beginning, models deal only with quantifiable factors. But qualitative factors may also affect a decision, particularly in strategic planning. Models lack innovative flair; they do precisely what they were designed to do. They will not create options, but rather assist in evaluating them.

These limitations apply to all methods of evaluating options. As noted by P.H. Grinyer and J. Wooller, "Financial models help good management to make better decisions, but cannot prevent poor management from making bad ones" ("Corporate Models Today," *The Institute of Chartered Accountants*, 1978).

Why Build a Model?

Companies face a good deal of uncertainty in their environment, whether from inflation, exchange rate fluctuations, raw material availability and price, new technology, competitors' activity or a host of other factors. Many organizations have

(Continued on In Depth/10)

(Continued from In Depth/9)

sought to deal with this uncertainty systematically by instituting formal planning procedures, normally from one to five years, but ranging up to 10 years. The purpose of these procedures is to determine the effects of various policies and assumptions on each aspect of the organization, but more particularly on the organization as a whole.

One limitation of formal planning procedures, if carried out manually, is the sheer quantity of calculation and reporting required. In most organizations, the work involved will severely limit the permutation of options to be evaluated. It will preclude changes to basic assumptions near the planning deadline, thereby degrading the plan. In such an environment, options may be consciously avoided with the planners, or perhaps "human calculators," closeted away until publication day.

Data is absorbed, not analyzed; it is grabbed in desperation to meet the publication deadline.

The problems are compounded by most organizations having a multiactivity, multilevel structure that implies a good deal of consolidation to arrive at a top-level plan. The repetitive additions required are not only time-consuming, but extremely tedious and naturally prone to error. Correctly constructed models, particularly if a modeling system with powerful consolidation features is chosen, will alleviate the time and work load constraints. In addition, although they will not create options or opportunities, they do provide rapid feedback. This allows managers to develop ideas more systematically, utilizing their time creatively and avoiding drudgery.

Less Obvious Advantages

There are a number of less obvious but no less important advantages of building and using financial models. First, once the logic has been thoroughly tested, the computer can be relied on to do arithmetic calculations entirely accurately. Second, the explicit definition of logic and data contained in a model requires the planning process to be reexamined, perhaps revealing inconsistencies and redundancies. For example, two divisions may be using different forecasts for the price of the same raw material. Finally, renewed discussion may ensue between the various departments involved in planning until they eventually agree on the form of the model.

Furthermore, the plan may be post-evaluated. Given an explicit statement of the logic and data, these assumptions may be reviewed as time passes, possibly leading to a general improvement in the planning procedures and assumptions.

Questions in Model Building

There are several major questions to answer before the first model is written.

Choice and Sequence of Applications. Very few companies have the same decisions to analyze or the same reporting requirements. In addition, each company will be subject to different pressures at any one time — perhaps a cash shortage, a possible acquisition to consider, or several major projects competing for limited resources.

Such variety implies a need for flexibility in the language or system chosen for modeling. It also means that the sequence of modeling applications is not subject to a general rule, but dependent on company circumstances. There are, however, some general guidelines, particularly with regard to the choice of the first model to be written.

We feel that models should never be enormous monolithic structures. This is particularly important for the first model on which the techniques may be learned and which may be used to judge whether modeling is worthwhile. In addition, if the first model is modest, there is less need to spend a great deal of time making the decision to proceed, since the expected costs will be relatively low and risk of failure minimal.

However, the application should not be chosen in isolation, without regard to an overall development plan, unless of course the problem is entirely self-contained. Indeed, if the model is to form one part or module

(Continued on In Depth/14)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

You'll get a hard look at the software market in Computerworld's May 25th Special Report "Systems and Utility Software."

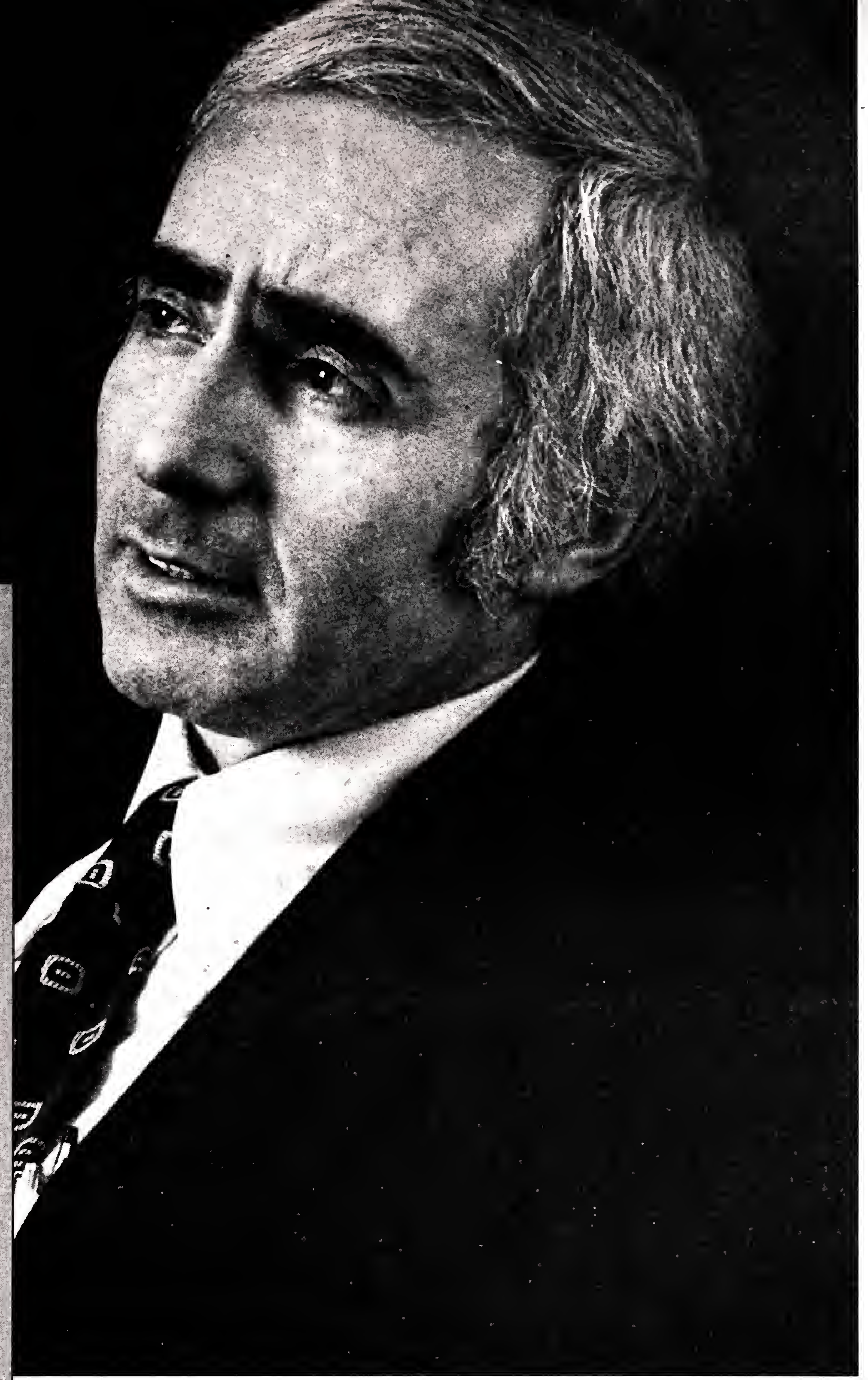
How far has the systems and utility software market come and what future trends should users be on the lookout for? *Computerworld* has some answers—based on extensive research we've conducted in this sector of the software market. In this comprehensive Special Report edited by Rita Shoor, you'll read:

- The difference between the apparent cost of software and the price you really pay through bad record keeping, lost discounts and other hidden costs.
- How the right utility software can improve your thru-put and application development in your organization.
- A review of how end-users put these "workhorses" to use and take advantage of hidden values.
- Plus, accounts of user experiences and tutorial essays along with reviews of current products and predictions about future trends.

If you're an MIS executive, DP Manager, Supervisor or Programmer, you'll find our May 25th report especially valuable. If you market systems or utility software, your ad should be there. Ad close is May 8th. For details, contact your *Computerworld* representative. Or, to reserve ad space, call Frank Collins at (617) 879-0700.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

BOSTON	CHICAGO	NEW YORK	SAN FRANCISCO	LOS ANGELES
Bob Ziegel Chris Lee Ed Marecki Kathy Doyle Diane Sukey (617) 879-0700	Dave Dolber Bob Ziegel Jan Heaney (312) 827-4433	Don Fagan Mike Masters Peter Senft Candy Kelly Marge Corcoran (201) 967-1350	Bill Healey Barry Millione Ruth Gordon Adele Framer Linda Tucker (415) 421-7330	Jim Richardson Bob Hubbard Kathy Knox (213) 450-7181



“We get many systems up instantly with INQUIRE.®”

Len Shainheit
Group Leader, Engineering

It's a real life situation when one of our engineers will walk into the information center and say, "I'm leaving on an airplane for Singapore this afternoon. I need some drawings and correspondence I think were done three years ago on such and such a project." He will board the airplane with his drawings and memos, thanks to INQUIRE. As the engineering division for a major oil company, we have over 50,000 valuable documents on microfilm. The contents of those documents and other information is kept on INQUIRE. We can do searching by keywords to find all documents pertinent to a given subject. Such access to past information saves us many man-years of labor and allows us to build on our past experience.

For producing computerized prototype systems, we generally turn to INQUIRE. The system permits computer professionals to rapidly build a database, write required reports, and through its macro language, make the system transparent to a user department. In the end, anyone can operate INQUIRE. Our personnel department uses an INQUIRE system heavily. In another database we keep track of all contract engineers and their skills. I have built a "business card and casual conversation database" for my boss, who travels a great deal and likes to collect business cards of people he meets around the world. When he plans a trip, he takes a printout of all past acquaintances in that part of the world. That database was a spare-time project.

INQUIRE allows us to bypass the "study" phase of a system. Working directly with the user, showing him results immediately, we achieve our finished system faster, Moreover, since the user has been involved at the outset, the situation of being presented with something completely unknown just disappears.

I'm personally very glad to have INQUIRE around.

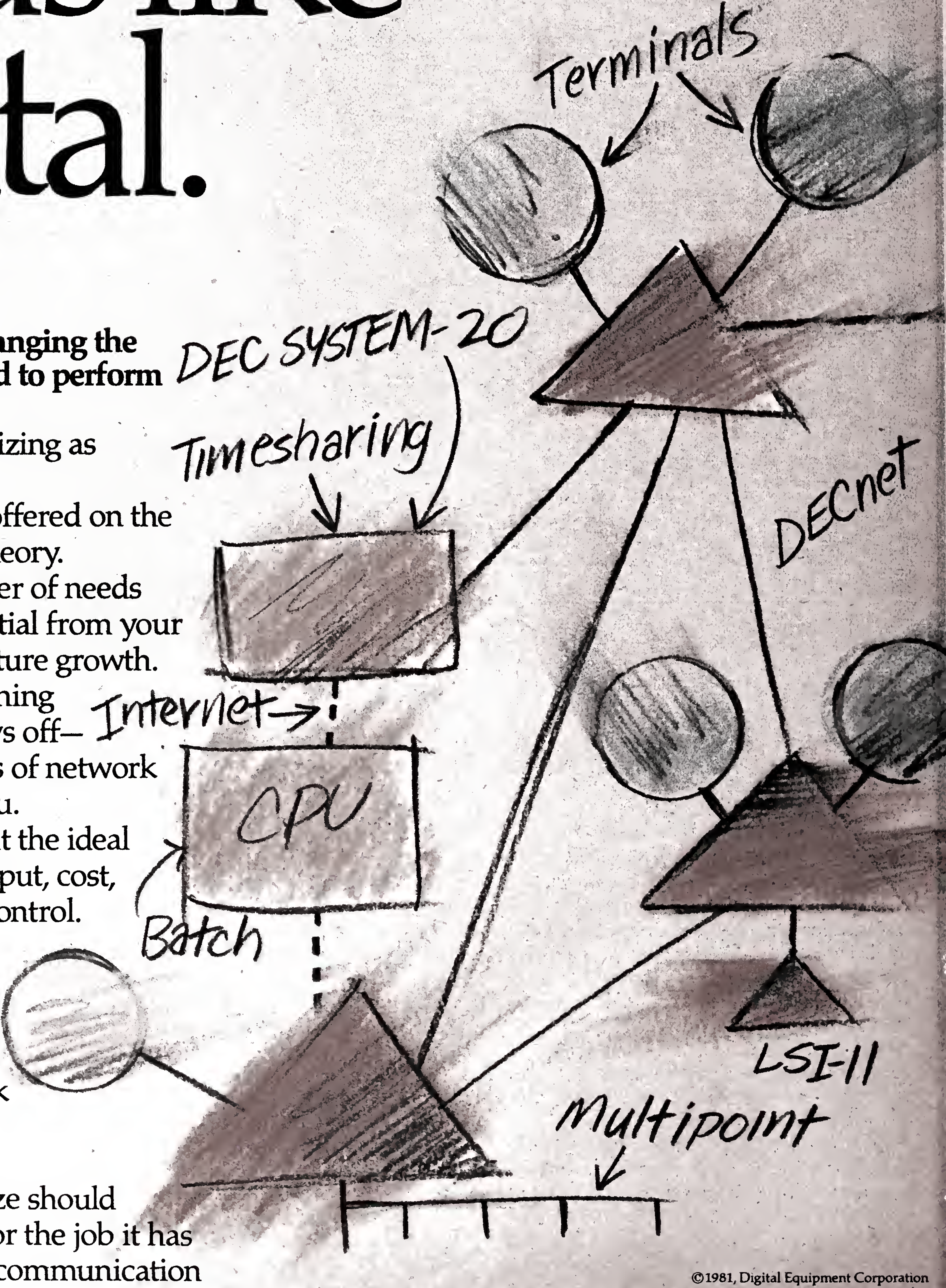
If you run MVS, VS-1 or VM, productive software from Infodata can help solve your information problems. Call us today to find out exactly how.

Infodata
Infodata Systems Inc.
5205 Leesburg Pike
Falls Church, Virginia 22041
800-336-4939
In Virginia, call 703-578-3430
Offices in:
Dallas, Los Angeles, New York
Rochester, NY, St. Louis, Washington, DC

®INQUIRE is the registered trademark of Infodata Systems Inc.

©1981 Infodata Systems Inc.

Nobody sizes up your network needs like Digital.



Digital's know-how is changing the way networks are planned to perform right from the start.

Not everyone takes sizing as seriously as Digital.

You'll see networks offered on the "one technology fits all" theory. Networks that fill a number of needs but may not get top potential from your investment or allow for future growth.

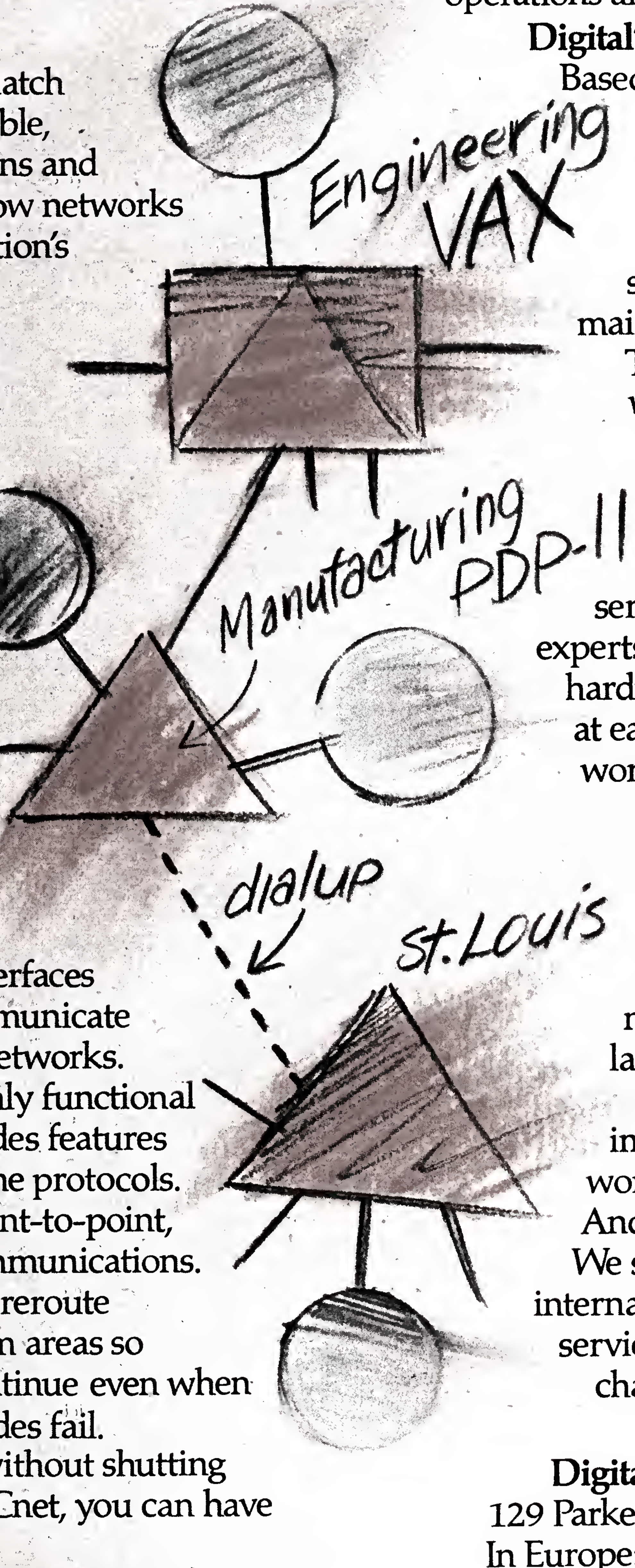
At your earliest planning stages—where it really pays off—you can put Digital's years of network experience to work for you.

Experience works out the ideal balance of speed, throughput, cost, data integrity, flexibility, control.

Experience asks the right questions to start with. Basics such as: What business problem do you want your network to solve? What systems must communicate?

To specifics: What size should each individual node be for the job it has to do locally? How much communication

©1981, Digital Equipment Corporation



redundancy should be planned to avoid downtime? What options are possible later for future growth?

And how do you meet your requirements most economically?

Digital's range of options.

No other vendor can match Digital's broad range of flexible, cost-effective communications and processor options which allow networks to be sized to your organization's particular needs.

A few examples. Some manufacturers support only BISYNC or X.25. Digital supports Batch BISYNC, Interactive BISYNC, and other standard mainframe communications protocols.

An advanced SNA protocol emulator allows Digital systems to participate in IBM/SNA networks.

And Digital offers X.25 Packetnet™ System Interfaces so Digital systems can communicate to public packet-switched networks.

DECnet,™ Digital's highly functional networking software, provides features not available with mainframe protocols. With DECnet, you have point-to-point, multipoint, and parallel communications.

You can automatically reroute information around problem areas so network operations can continue even when communication links or nodes fail.

Even add new nodes without shutting down operations. With DECnet, you can have complete control.

Your Digital Network Profile.

A Digital team of networking experts will work closely with you, from concept through installation through support.

First, a written Profile details your network requirements. The number and location of each proposed node, each terminal. Types of network applications. Volume of data to be transferred between individual nodes. Data urgency and importance. Line and system reliability, availability, and maintainability. Costs. Network operations and security. Future growth.

Digital's Customer Support Plan.

Based on your Network Profile, our experts, working with you, document how Digital will help satisfy your needs. Installation, start-up, training, network maintenance, troubleshooting. This plan clearly spells out what Digital will do, when it will be done, and how it will be accomplished. Following this thorough preplanning, Digital field service and software support experts will install and verify the hardware and software needed at each node, and demonstrate working network connections.

Digital planning leads to Digital performance.

A working network, ready to go. Ready to perform to the maximum now. Capable of expanding later as your business grows. To date, Digital has implemented over 5,000 network nodes around the world. And we don't just install them. We support them, too, with an international team of over 14,000 service people. At Digital, we're changing the way technology works for your needs.

Digital Equipment Corporation,
129 Parker St., Maynard, MA 01754.
In Europe: 12 av. des Morgines, 1213
Petit-Lancy/Geneva. In Canada:
Digital Equipment of Canada, Ltd.

digital

We change the way the world thinks.

(Continued from In Depth/10)

of an eventual system or suite of models, some thought should be given as to how it will link to other modules later.

The information the first model provides should be of real use of management. If it is to form part of a formal planning process, the model should be instituted immediately, replacing some of the manual procedures. In general, it could be argued that the closer to the top of the organization the model's results are used the better, though clearly this may be influenced by political factors.

Risk analysis models, which require probability distributions for input variables, are often expensive to run since they involve at least 100 trials to generate probability distributions for calculated variables. Such a model is technically more difficult to construct, almost inevitably involving specialists. In addition, the larger the model, the more difficult the conceptual problems associated with correlation between variables and between time periods. It is also difficult to obtain reliable probability forecasts from management.

Finally, one major influence on the choice of initial application will be the personnel resources available. If the modeler has no direct knowledge of the problem, clearly a modeling specialist must be available to explain the requirements in detail.

How much top management is necessary? Obviously, if top management support is available, the project will have a greater chance of success. There have been occasions, however, where middle management has taken the plunge and successful results have provided the necessary impetus for more extensive work.

What type of system or language? The first choice lies between ready-made and tailor-made systems. Ready-made systems, in spite of their almost immediate availability, have not made much impact on the market. Their generalized nature restricts them to accounting relationships and they offer little flexibility for adapting to particular company requirements or changing circumstances. Most models are therefore constructed to tackle a specialized modeling language.

The second choice lies between a standard computer language and a modeling system. It is possible to write any model in a standard computer language — eventually! Being a general rather than a specialized language, all processes have to be written by a programmer, including data input, reporting, sensitivity analysis and consolidation, as well as functions in the logic such as tax, interest and depreciation calculations.

Although this drastically increases development time, and therefore cost, there are likely to be few constraints on the content of the models. Almost paradoxically, however, this flexibility does not extend to changes in the models to reflect new requirements or organizational structures. This is because the program will have been written to solve a specific problem rather than a range of problems in a similar area.

Most people think that models written in a specialized modeling language will be more expensive than a program written in a high-level language such as Fortran or PL/I. This is inevitably true if the modeling system itself generates a Fortran or PL/I program, because of the extra compilation necessary and software royalties that may be incurred.

Some modeling systems, however, are written in low-level Assembler language and compile the models directly into computer-readable statements. These systems are likely to be the most efficient of the specialized modeling systems.

The main argument in favor of those specialized financial modeling systems and languages that are easy to use and do not require specialized programming knowledge is that they can be used directly by the accountant or planner who is familiar with the problem. The user therefore has control over development and maintenance schedules, so changes can take place as the models evolve. Communication with a second or third party, if a systems analyst and programmer are involved, is avoided.

The mathematical language APL is sometimes said to be suitable for financial models because of its interactive nature and ability to manipulate matrices. Its general use in this area is likely to be restricted because it is based on special characters that are not easily understood by the average financial planner. In addition, when APL is used in its raw form, the user has to program all the routines.

APL has one less obvious drawback: Each time an APL program is calculated, each relationship or equation is interpreted into internal computer format. In most other languages, compiled forms are used so that interpretation takes place only once per terminal session, or even less if the compiled model can be permanently stored. APL programs and modeling systems that generate APL can therefore be inefficient in certain modes of use, particularly if multiple program calculation is required. Such is the case for models that solve simultaneous equations or perform the same calculations for a number of similar cost centers or products. In spite of these problems, some financial models have been successfully built using this language.

One further advantage of a modeling system is that it may contain certain facilities for handling large quantities of data easily and may have true data base management facilities built in or have a direct interface to such a system. A true data base management system will not only include facilities for maintaining and updating data, but also for extracting and comparing records on the basis of their content.

Who will do the modeling? One of the recent major changes in computing is the trend toward conversational time-sharing methods, combined with systems and languages that can be used by nonspecialists. Several of the financial modeling systems on the market fall into this category, making it possible for the accountant or planner to write his own models. There is a strong trend in this direction since the need for communication with a specialist via a fixed specification is removed. Changes can take place as the model evolves, thus releasing the full potential of flexible development. Users are more likely to be committed to the end product.

A second possibility is to use internal specialists, such as operational research analysts. Most early models were written in this way, normally using standard programming languages such as Fortran. If this approach is adopted, good documentation and a technically simple language are necessary, so that users can understand the model.

Another option is to use outside consultants who will produce a complete set of models, often at a fixed price. It is preferable, however, to include the consultants as members of a joint project team; otherwise they may have to be involved each time the models are changed, thus sacrificing user control, one of the most important advantages of financial modeling. A less expensive way of using consultants is to have them provide a few days of specialized help, which should speed up the project's start.

Whichever approach is adopted, it is important that adequate time be al-

(Continued on In Depth/18)

Announcing Electronic Filing from Kodak.

In an age of ever-increasing information, Kodak presents a way to get to the bottom of things fast: The Kodak IMT-150 micro-image terminal.

Computers are best used to store and provide summary data. But sometimes you need the entire original document. Beginning with only a fragment of data such as a date or invoice number, the IMT-150 terminal quickly provides you with an image of the genuine article—the sales slip, bill of lading, invoice, or whatever.

The document you see here, for example, is stored somewhere in the middle of 14,000 other microfilmed documents. Yet an operator can call up this *specific* document on the viewing screen of an IMT-150 terminal in less than 9 seconds. And a dry paper print is available at the touch of a button, again in a matter of seconds.

Your mini or mainframe computer knows the proper microfilm cartridge to select; the IMT-150 terminal's own computer "knows" exactly where to go within the cartridge to find the document you're looking for.

Kodak offers a whole family of electronic filing equipment. From microfilmers to microfilm reader-printers to dry COM laser printers—many with their own built-in intelligence and more sophisticated electronics.

Electronic filing is an integral part of the modern automated office; look into it by completing the coupon below.

Kodak

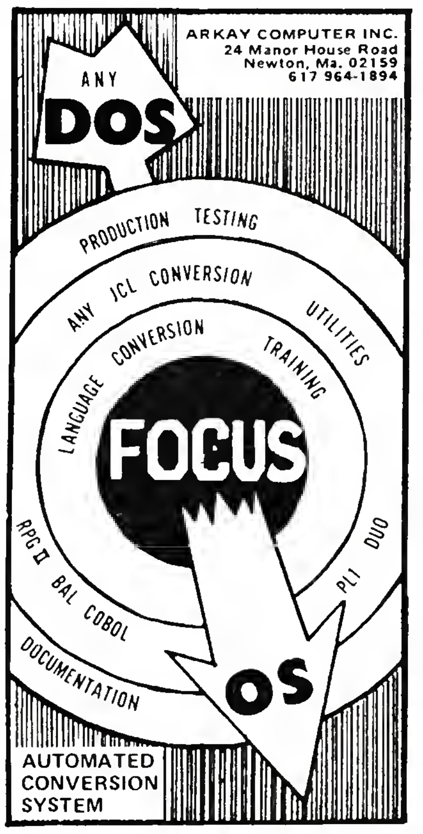
© Eastman Kodak Company, 1981

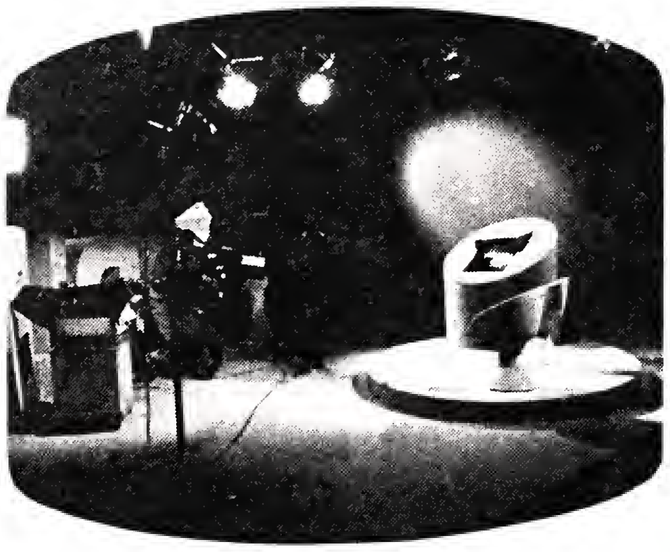
EASTMAN KODAK COMPANY
DEPT. DP1547, ROCHESTER, NY 14650

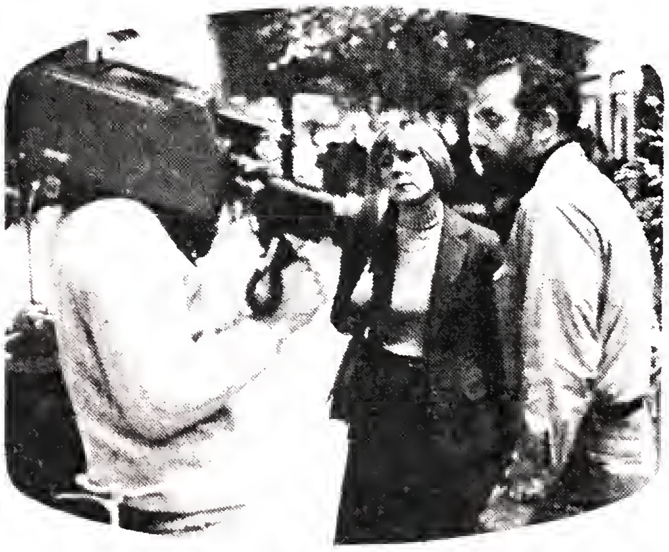
☐ I want people to be able to get to the bottom of things fast around *my* office. Please send your brochure on Electronic Filing from Kodak.

☐ Better yet, have a Kodak representative call to arrange a free information planning survey of my office.

NAME TITLE
COMPANY
ADDRESS CITY
STATE ZIP PHONE







Now you can experience the world of computers on television

The computer industry is experiencing almost unbelievable increases in productivity. As one expert has said:

> *"If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon."*

This rapid technological change is, in turn, fueling an incredible change in the functioning of business and society in the industrialized world.

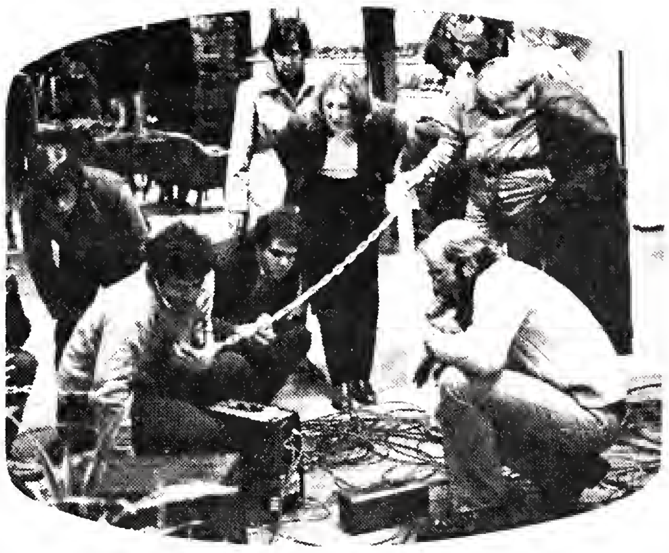
As computer people, you are in the middle of this revolution. And as the world's largest publishers of computer-related newspapers and magazines, we do more reporting on the computer revolution than anyone else.

Now, we are going to use the medium of television to step back from the trees and take a look at the forest. We invite you to join us.

Computerworld on television takes a fascinating look at the impact of computers on our society. In a weekly, half-hour newsmagazine, you will see, hear and experience the effect of computers on medicine, sports, law, business, crime, personal privacy, personal growth, home life and much more. You will find out about failures as well as successes, progress and problems. You will hear and see the people who are involved, including:

- **Deaf children whose education has been revolutionized by the computer.**
- **Professional scouts who have used the computer to change the face of pro football.**
- **FAA Controllers who use computers to land your plane. Is the system adequate?**
- **Lawyers who are using computers to analyze supreme court decisions.**
- **Privacy experts who are trying to prevent computers from creating a "big brother" society.**
- **The psychologist who uses computers to study criminal behavior.**
- **DP experts in banks whose techniques are doing to paper money what money did to the barter economy.**
- **Computer people in business who have used computers creatively to improve their businesses — or to create whole new ones.**
- **Weather experts who use computers vs. the Old Farmer's Almanac.**

Introducing "Computerworld"—the first televised newsmagazine devoted to the development and application of the technology that is revolutionizing the way we function.



Computerworld for television will also step back a bit to provide some perspective on the continuing rapid technological changes in computers. Where is technology today? Where might it be tomorrow? What significant new products are becoming available? How is the industry changing and what is the impact of that change?

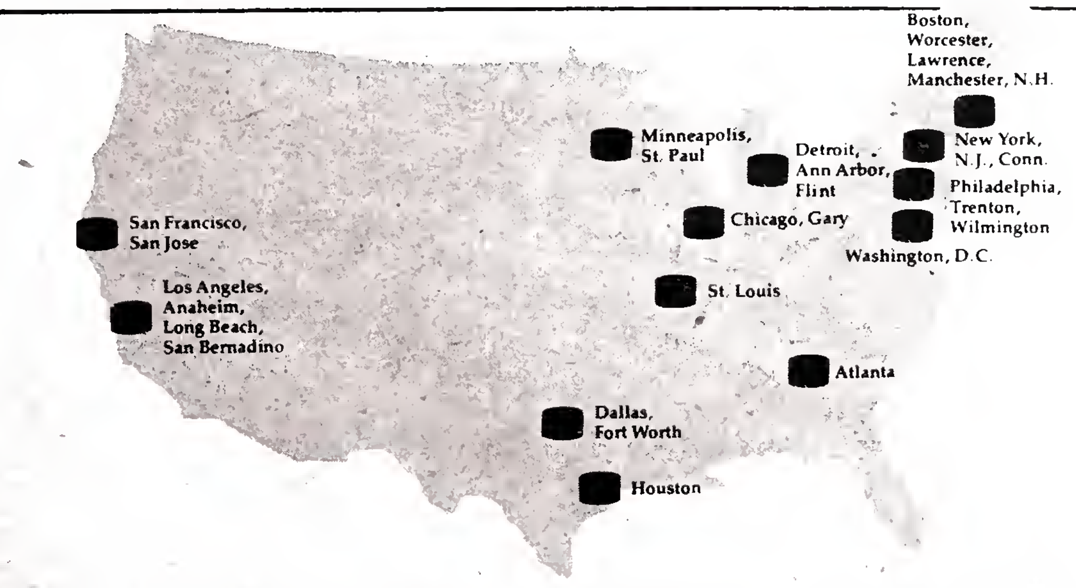
And, we aren't forgetting the lighter side. We'll cover a computerized adult game that helps you improve your sex life. Or the latest in non-sexual computerized entertainment. We have commentary on some of the pitfalls and problems on dealing with computers—both as expert and customer.

There's much more to Computerworld for television, but we can't go into it all. We invite you to find out for yourself. Both experts and interested laymen will enjoy and benefit from this unique new television experience. We're starting with coverage of 13 major tv "ADI'S" (Areas of Dominant Influence), which include about half the computer people in the U.S. Later we will add more markets.

Here is the current schedule of stations and times:

City	Station	Channel #	Day	Time
New York	WPIX	11	Saturday	9:00 AM
Chicago	WSNS	44	Tuesday	6:30 PM
Los Angeles	KWHY	22	Saturday	12:00 Noon
San Francisco	KTSF	26	Saturday	9:30 AM
Boston	WXNE	25	Wednesday	10:30 PM
Washington, DC	WDCA	20	Saturday	12:00 Mid.
Philadelphia	WTAF	29	Monday	10:30 PM
Dallas/Ft. Worth	KNBN	33	Tuesday	5:30 PM
Detroit	WXON	20	Saturday	10:00 AM
Minneapolis/St. Paul	KMSP	9	Saturday	TBA*
Houston	KHTV	39	Monday	12:00 Mid.
St. Louis	KDNL	30	Sunday	5:30 PM
Atlanta	WANX	46	Tuesday	11:00 PM

*Check local listings for time.


Boston, Worcester, Lawrence, Manchester, N.H.
Minneapolis, St. Paul
Detroit, Ann Arbor, Flint
New York, N.J., Conn.
Philadelphia, Trenton, Wilmington
San Francisco, San Jose
Chicago, Gary
Washington, D.C.
Los Angeles, Anaheim, Long Beach, San Bernadino
St. Louis
Atlanta
Dallas, Fort Worth
Houston

Presented by

CW COMMUNICATIONS/INC.
375 Cochituate Road
Framingham, MA 01701
(617) 879-0700

Note to advertisers: **If you would like to consider buying commercial time on *Computerworld,* contact Bob Ziegel or Steve Woit at (800) 343-6474.**

We deliver in hours because a lot can happen overnight.

A lot of unnecessary waiting. And worrying. American Airlines Priority Parcel Service doesn't make you wait overnight. We can deliver your small parcels virtually anywhere in hours. *In hours!* To every part of the continental U.S., Hawaii, Canada, Mexico and the Caribbean. And when you call toll-free (800) 638-7320, we'll even provide door-to-door service any time of the day or night.

So call American for delivery today. And rest easy.

AmericanAirlines Priority Parcel Service
Doing what we do best.

China Computerworld

电脑世界

The only specialized computer publication written exclusively for the People's Republic of China (PRC)

The PRC is a huge country with a relatively small installed base of computers. But the future looks very bright for the Chinese EDP business.

Government plans call for extensive use of computers in the PRC's technological modernization, and annual EDP expenditures are expected to grow into the billions in the 80's.

A good deal of this money will be spent on foreign computer equipment, and the decision-makers for this equipment will be using **China Computerworld** to help them in choosing the products and the companies they need.

China Computerworld is a joint venture of the Fourth Ministry of Machine Building and CW Communications/Inc. and it includes among its 50,000 subscribers the key government officials and **computer** managers who have EDP **purchase** decision authority.

China Computerworld is published the first and fifteenth of each month. It is a tabloid with a newspaper format, and gives you a unique opportunity to introduce your products and services to this sleeping giant of a marketplace.

CW International Marketing Services Department can give you one-stop advertising service in countries around the world. For more information about **China Computerworld** or any of our other foreign publications, just fill out the coupon below.

Diana LaMuraglia, *Manager, International Marketing Services*
CW COMMUNICATIONS/INC.
375 Cochituate Road
Box 880
Framingham, MA 01701
(617) 879-0700

Please send me more information on
____China Computerworld ____Your Other Foreign Publications
Name____
Title____
Company____
Address____
City____ State____ Zip____

CW COMMUNICATIONS/INC.
Publishers of *Computerworld* and other leading computer publications around the world.

Modeling System Checklist

Availability

- If the modeling system will eventually be used on the company's own computer, is a version available for that machine and any likely replacement?
- If only bureau use is required, does the bureau offer local support and telephone dialing?

Ease of use

- Is the system interactive?
- Is the language and system command structure easily understandable by the user, generally not a computer specialist?
- What standard of documentation is available?
- How long is the training course and what does it cover; are training manuals available?
- How soon could a novice write and run a simple model for a project appraisal?
- Can the model be said to be self documenting?

Cost

- What are the relative processing costs? The most useful information here is provided by benchmark.
- What are the relative connection and data storage costs?
- What is the fee for in-house use?
- Is there any maintenance or support charge?
- Is any additional hardware required?
- For bureau use, is there any signing on fee or minimum charge?

Support

- What is the quality and quantity of support? Is it provided by planning consultants or computer technicians?
- Where is the support located?
- Are on-site visits available?
- Is consultancy available?
- Is there direct access to the system's authors?

Facilities

All modeling systems can solve simple problems. There are differences, however, in their ability to handle large and complex problems. The main factors here are:

- Maximum number of rows and columns allowed in the work area.
- Flexibility of data file handling. Data may need to be transferred by row, column or in blocks of any size, to and from any number of files which may be very large.
- Advanced language facilities including conditional tests, GOTOs, loops, indirect addressing, row or column operations without resort to the use of a high-level language such as Fortran.
- Consolidation facilities, particularly the direct interpretation of company structures or hierarchies.
- Flexibility of report formatting.

Figure 1

(Continued from In Depth/15)

located the people involved. Models developed at the rate of one hour a week are unlikely to succeed.

What type of computing facility? The options range from programmable calculators to very large mainframes.

The following choices need to be made before an overall decision can be reached:

(a) *Interactive (conversational) or batch processing?* Most successful models and indeed many conventional programs are developed interactively to speed the process. This method is more easily used by nonspecialists. Batch processing still has its place for running large models that have been developed interactively either to reduce costs or spread the computer load.

(b) *In-house or time-sharing service?* The cost of time-sharing service computing normally varies with usage, making it an attractive way to evaluate both the concept of modeling and a particular system, especially as user support is often available without additional charge. Time-sharing services also offer a wider choice of modeling systems than is available for in-house use, and access to the computer is usually less restricted.

Until recently, the use of an in-house computer was linked both to batch mode and the use of standard programming languages. With more companies acquiring computers with interactive facilities and the availability of modeling systems for purchase or rental, this no longer applies. The decision now depends on the economics and the need for data transfer between models and other in-house computer systems.

It is sometimes suggested that the data storage costs of a large corporate data base would be prohibitively expensive on a time-sharing service, but our experience indicates that processing costs are a more significant factor. Whatever the reason, there is no doubt that there is a trend toward in-house computing by the larger users of financial modeling.

One point stands out clearly: If an organization decides to use an external service initially—but retains a longer term option to move in-house, it should choose a system that can be used in both ways. This is likely to be an independently owned system, since most time service-owned systems are not available for in-house use.

(c) *If in-house, mainframe or mini?* This choice has become more of a reality as more modeling systems become available on minicomputers. The decision will be based on cost vs. comparative facilities of the two options. A dedicated mini will avoid any response competition with other jobs, but because minis are generally less powerful, processing speed needs to be investigated carefully, particularly when several users are using the machine together. Other factors such as network testing and access to company data or other computers need to be considered.

Which modeling system? The choice of a modeling system is important, since the scope and power of systems differ greatly. Various checklists of features are available, but they do not mention all of the essential features and the relative merits of each feature are ignored. The potential user wants to know which features are important, whether they are available and, if so, their efficiency and presentation.

Major features or considerations that should influence the choice of modeling system are listed in Figure 1. Within each section, these features are broadly ranked. More details are shown in Figure 2.

Large and Complex Models

There has been a good deal of discussion about the general approach to model building in terms of feasibility studies and the considerations in writing individual models. But to date there has been relatively little written about the general problems in designing large systems of interlinked models.

There are a number of design decisions to be made. They concern the following:

Level of detail. At what point will the model interface with the manual system or existing computer systems? The overriding need here is not to go below the level at which the data changes, alternative testing or sensitivity analysis will be required. For instance, if the actual planning and eventual monitoring takes place at the product group level, there is little point in including product-level data in the model.

Inclusion of optimization or risk analysis. If this is chosen, the analysis should be carried out for specialized modules such as capacity planning and project appraisal and kept fairly simple.

Treatment of historical data. Actual results for past periods are often used for comparison purposes on reports. For this purpose, extra columns may be introduced into the model which are then avoided during calculation or, more commonly, a data file containing historical data is accessed during reporting.

If past data is used for statistical forecasting, it is usually kept as a separate module since it will not be desirable to reforecast each time the main models are calculated. The forecast values will be stored on file and read by the main models.

Inclusion of physical, empirical and heuristic factors as well as financial factors. The further down models reach toward operating units, the more likely the inclusion of physical variables becomes. Carried to the extreme, this would result in a different model for each activity. This is not normally necessary, but important or complex processes may merit such detail.

A small percentage of models contain statistically derived empirical relationships. For example, sales may be explicitly related to price, advertising, competitors' activity and so on. These models can be extremely valuable, but require regular validation and high-quality historical data.

Heuristic relationships are often included in models to represent assumed decision makers' actions. For example, net cash outflow will be financed by overdrafts up to a limit of $10 million and then by long-term loan amounts of $1 million.

Selection of the modules. The major decision here is whether the problem is to be treated as hierarchical or functional or a mixture of both. Briefly, hierarchical models involve the consolidation of basically similar activities such as products. The functional approach involves separate models for purchasing, production, marketing, capacity planning and so on. Hierarchical models are conceptually simpler and allow the use of powerful special facilities in some modeling systems.

The structure of the data input is important. If it is available in a different form than required — for example, by location when it is needed by product — an input module will be required to create useful data files. Any necessary data validation such as range or total checking would be included at this stage.

If there is a point in the planning process where management evaluation of results is necessary before continuing, then at least two modules are required. For example, production managers from various factories may use a model to decide how products will be allocated among the plants for the next year. Only when this is decided would it be worthwhile continuing with the rest of the planning process.

Details to Check Out

Logic
- Number of preprogrammed financial and calculation functions.
- Automatic generation of repetitive logic.
- Syntax checking as each line is input or at the end.
- Do temporary or permanent logic changes require full recompilation?
- Storage and execution of compiled logic.
- Renumbering of logic lines and references.
- User-designed prompts issued by the model.
- Forward referencing.
- Automatic simultaneous equation solving.
- Variables referenced by name or number and input in any order.
- Number of characters in variable descriptions.
- Subroutines.

Data input and management
- Data input by period, by growth rates, by interpolation, by extrapolation and in relation to other rows.
- Scaling of data input, facility to repeat items.
- Data validation.
- Input starting at any column.
- Maximum data file size.
- Model linking via data files.
- Data editing, including shifts in time.
- Single and double precision.
- Access to true data base management system.
- Interface to data files of other computer systems.

Reporting
- Quick working reports.
- Reports and their sequence independent of the logic.
- Graphs, histograms, plotter interface.
- Reports directed to printer or file as well as the terminal.
- Reports sorted alphabetically or numerically.

Sensitivity and "what-if" analysis
- Temporary and permanent data and logic changes.
- Percentage or absolute changes, to input data.
- Stepped sensitivity analysis.
- Backward iteration to achieve a target value.
- Temporary suppression of logic constraints.
- Data changes can be saved.

Statistical analysis and forecasting
- Trend projection/curve fitting.
- Time series analysis.
- Econometric modeling facilities.

Consolidation
- By command or by logic.
- Hierarchical multilevel consolidation facilities.
- Automatic inflation and currency conversion during consolidation.
- Cross-section reporting.

Other
- Comprehensive, integrated editing facilities.
- Diagnostic debugging aids.
- Ad hoc calculation mode.
- 'Expert mode': several responses input at once.
- Risk analysis.
- Optimizing facilities.
- Inflation facility independent of model.

Figure 2

The maximum size of the matrix allowed in working then puts an upper limit on logic module size. Variables between which a good deal of sensitivity is required need to be included in the same module if continual expensive model switching is to be avoided.

If part of the system is subject to greater uncertainty and more likely recalculation than the rest, a separate module may be desirable to save the costs of unnecessary calculations on other parts of the system. If certain data is available much earlier than other data, sometimes there is a case for a module to process this data to avoid delaying the complete job.

If certain parts of the process are under the control of different individuals, these will normally be created in separate modules — even if the logic is the same for each — in order to avoid delays, unnecessary reruns

(Continued on In Depth/20)

(Continued from In Depth/19)

of the whole job and the risk of corruption of data files. Given a choice, the number of separate data files should be minimized to reduce housekeeping problems. Data for similar activities should be kept on one large file in sections. However, intrinsically different data should not be stored on the same file.

Structured or user-written consolidation. If all or part of the problem is seen as hierarchical, then a few modeling systems offer the choice of preprogrammed consolidation features or a user-written consolidation mode. Hierarchical consolidation features will give more long-term flexibility to deal with organizational changes more quickly. Facilities for automatic currency conversion, inflation and allocation down the tree may be included. They will allow consolidation of the same base units according to more than one tree, such as geographically and by product type.

User-written consolidation models require more programming expertise, but will probably be more efficient within the same modeling system.

Dimension organization. Large problems are often multidimensional. A typical three-dimensional problem involves time, variables such as price and profit, and activities such as products. Since the typical modeling work area has two dimensions, the dimension that is not allocated to either rows or columns has to be chosen. This is often activity but, subject to the constraint of the working area size, it would be time, providing the majority of reports cover a single time period and there is little interaction between periods.

Assumed operator knowledge and competence. The more the operator knows about the models and the modeling area, the more flexibility he should be allowed for a given level of error acceptability. Some modeling systems allow the models to be packaged to a high degree. This is achieved by using prompts and validation checks so that the operator need know very little about the system, but will still be unlikely to make mistakes.

Monitoring and control. If the plan is to be monitored by computer during its life, it must be stored on file. A separate module is normally used to read both the plan and actual results and produce control reports.

The Future

Technical improvements to financial modeling systems will certainly increase the speed of calculation, improve ease of use and extend functions in the logic. The availability of such systems will continue to expand across the range of hardware, the major current drive being toward minicomputers. On the hardware front, there is already a move toward better graphics, including colored graphics and three-dimensional output.

Application types will develop and extend, perhaps toward models of the company environment, total industries and the competition. Small businesses will become involved as costs continue to decrease in real terms.

Financial modeling systems have directly involved accountants and planners with the computer, and much of its jargon and mystique has been removed. It is no longer the sole domain of the systems analyst or programmer. With the availability of statistical analysis and forecasting facilities, the planner may begin to develop a more quantitative approach.

Whatever the developments, it is important that management and system users be involved in them.

Martin R. Collins and John M. MacGregor are with EPS Consultants in Chicago.

HOW DO YOU PRONOUNCE DATA CENTER?

At Spiridellis & Associates, Inc., **we** pronounce it **development data center,** with the accent strongly on development.

We have the resources—hardware, software, technical expertise, support personnel—to make timely, efficient, economical solutions to your system problems as accessible as they can ever be. An IBM 3031 with VM, so that we can logically recreate **any** IBM system/software environment you may be using, allowing you to off-load development projects and avoid impacting daily production demands on your own machine. Full IMS and CICS software to bring power to your development efforts. MVS, DOS and VS1. CMS and TSO to make interactive debugging feasible. An 8100 communicating directly with our 3031. An HP 3000 timesharing system available for testing of distributive systems. Access to Data Center machines via terminals installed where you are, if you wish, either in dial-up or dedicated line mode.

And, of course, the very highest calibre of dp professionals, systems internals specialists and technicians available under one roof, to support **your** prior investment in systems software while maintaining **our** position at the leading edge of systems technology.

What's the purpose of all this? To help you achieve immediate, significant improvement in the efficiency and productivity of your systems, actual or projected, and in the staff you've assigned to run them.

To allow you to develop and run **pilot systems** (or applications projects) in a completely equipped facility, with the entire range of technical support and needed hardware/software environment already in place. Without the enormous investment of time, money and staff that doing it all on your own would entail. And without sacrificing your own, precious machine time.

Our Data Center offers computer time sales, too, at surprisingly low cost. You may subscribe for time-as-needed with technical support. With linkage established between you and the Center via display terminals, we can "step through" any difficulties a member of your dp staff is having with your system, and convey an immediate solution back to you.

Our Data Center is also a full service disaster/back-up recovery/contingency planning facility. Specially trained staff are available to help you identify what your critical applications really are, and develop all the requisite programs, including data storage/update procedures, for you as part of the full service package. Just compare that with the "computer in a cold room" approach to disaster recovery of our nearest competitor.

The Data Center—and all the offices and facilities of Spiridellis & Associates, Inc. — speak to your needs. We think you'll find a **pronounced** improvement in any part of your operation we address.

We give you our word.

Spiridellis & Associates, Inc.
1133 Avenue of the Americas, New York, NY 10036 (212) 221 7270

NEW JERSEY 225 Old New Brunswick Road, Piscataway, NJ 08854 (201) 981 1114
CONNECTICUT 300 Broad Street, Stamford, CT 06901 (203) 324 1174
WASHINGTON, D.C. 7927 Jones Branch Drive, McLean, VA 22102 (703) 734 9848

© 1981, Spiridellis & Associates, Inc.

AKD
VOLUME DATA ENTRY SERVICES
HOTLINE
for INSTANT QUOTES
• OMAHA
(800) 228-9410
TWX 9106220199
AMERICAN KEY DATA
Mid America Plaza, Suite 144
7171 Mercy Rd., Omaha, Ne. 68106

Unlike Decentralized DP

Distributed DP Seen Still on Horizon

By Brad Schultz
CW Staff

LAS VEGAS — Decentralized DP has come of age, but distributed DP has yet to arrive, according to Prof. Philip H. Enslow Jr. at an Interface '81 session here recently.

Distributed DP would provide network services transparently — without the user needing to know which systems generated the services or how they were conveyed.

Decentralized DP is commonly mistaken for distributed DP, Enslow said, but the former term applies to a network in which user programmability and control over applications has migrated from host mainframes to dispersed minicomputers, microcomputers and intelligent peripherals.

Enslow is a professor with the Georgia Institute of Technology's Computer Science Department, which he says has the nation's largest academic research program in distributed DP, and is editor-in-chief of *Computer Networks*, an international scholarly journal.

In a decentralized DP network, the typical data communications environment for a large company, network services have yet to run transparently, Enslow said; so users still need a crew of technical experts on hand to support and troubleshoot facilities and to advise on procurements and upgrade planning.

In the quest for genuine distributed DP, "Hardware people can build anything we can specify, but software people can't even tell us what the problems are that they have to solve," Enslow asserted.

Four Features

One vendor has suggested through advertisements that distributed DP has four features: a common programming language, network processing, distributed information (dispersed data banks) and distributed data base management. But only the first two features are available now, Enslow maintained.

Distributed information raises problems that are at least defined but not yet solved, while distributed data base management still requires extensive study before it can really be brought out of the laboratory.

Eventually, systems will appear that provide the capabilities expected of distributed DP, Enslow predicted, but no proof has been demonstrated that these capabilities will be worthwhile.

Users presently contemplating a move to distributed DP should proceed gingerly, he advised, carefully assessing the organizational impacts of anticipated systems and issues such as how they will all fit together.

Data Line Problems

Joining Enslow at the conference panel was independent consultant John Lee Hughes, who designs the sort of systems that might be placed in a decentralized, if not distributed, DP environment.

According to the Westfield, N.J. expert, his big problem in implementing such systems has been private data lines, which telephone companies allegedly

(Continued on Page 62)

Bubble Memory Units Offer IBM 3780 Protocol

HOUSTON — Texas Instruments, Inc. is offering two bubble memory data terminals designed with IBM's 3780 protocol and data entry validation to serve markets requiring error checking capabilities and intelligent data entry functions.

The Models 767 and 769 are compatible with most existing synchronous 3780 protocol emulations and their associated communications networks, the vendor claimed.

The models were designed for batch data transmission and allow information to be collected off-line and batch transmitted at up to 2,400 bit/sec.

Both models feature 40,000 characters of built-in nonvolatile bubble memory storage. As the user's data storage needs increase, the terminal's bubble memory can be added in 20,000-char. increments, up to a maximum 80,000 characters.

The 767 costs $3,995 and the 769, $4,295, the vendor said.

More information may be obtained through P.O. Box 202145 H-576, Dallas, Texas 75220.

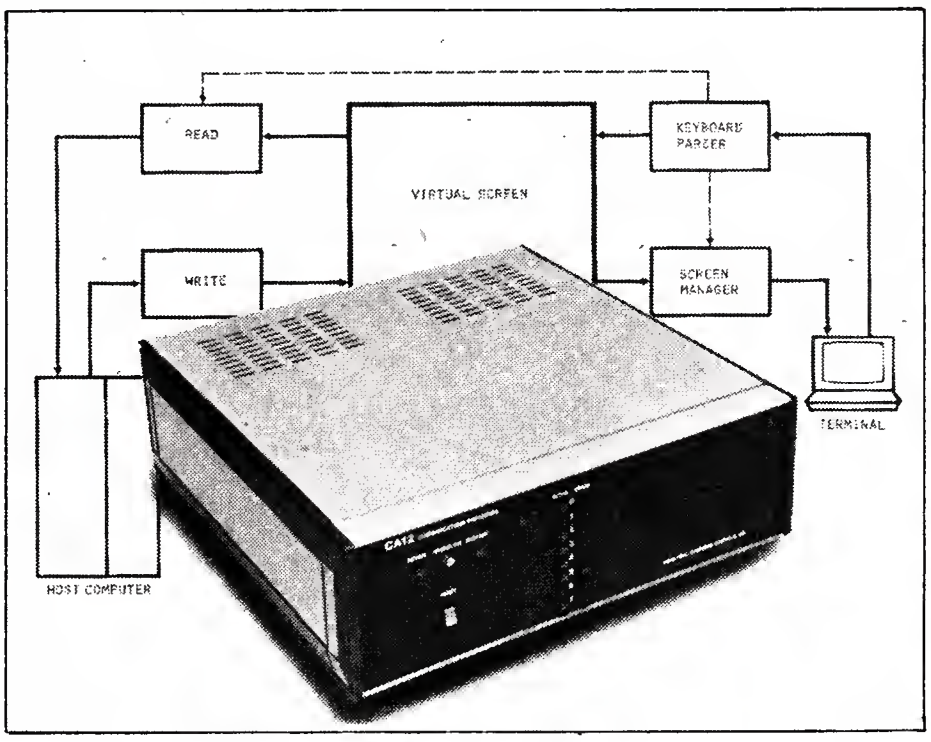
Converter Backs BSC, SNA 3270

CAMBRIDGE, Mass. — Industrial Computer Controls, Inc. has unveiled a protocol converter that reportedly supports IBM's Binary Synchronous Communications (BSC) and Systems Network Architecture (SNA) 3270 protocols.

The CA12-TCP supports up to eight asynchronous terminals as IBM 3277-type devices used with IBM's BSC 3271 cluster controller and 3278-type devices used with IBM's SNA 3276 cluster controller, the vendor stated.

The product's code and protocol capabilities interface the terminals to the host, while device emulation and function capabilities cause the terminals to

(Continued on Page 62)



The CA12-TCP

modems STAND ALONE RACK MOUNT modems

☐ SERIES 302
Bell 103 and 113A Replacement
300 Baud Full Duplex
Features Provided:
- Originate, answer and switchable modes
- EIA and Current Interface
- Carrier Indicator
- Half/Full Duplex Switch

☐ SERIES 212A
Bell 212A Replacement
1200/300 Baud Full Duplex
Direct Connect - No DAA
Each Modem Provides:
- Automatic answer
- Manual Originate
- 8 Status Indicators
- Analog Loopback
- Digital Loopback
- 300 or 1200 Baud

☐ SERIES 330
Bell 103, 113, 201, 202 Replacement
Mix 300, 1200 and 2400 Baud
Direct Connect - No DAA
Automatic Answer
Leased Line

Each Modem Provides:
- Integral Power Supply
- Display of 6 Functions
- Busy Out
- Loopback

PART 68 RULES & REGULATIONS FCC APPROVED

$197 Modem Stand-alone
$837 Modem Stand-alone
$237 Modem Auto Ans.
$137 Modem Leased Line
$147 2 Modem Unit
$297 8 Modem Unit
$497 16 Modem Unit

SEE US AT NCC Booth #520

☐ Acoustic Couplers ☐ Medium Speed Modems ☐ High Speed Modems
☐ Time Division Multiplexers ☐ Frequency Division Multiplexers

Please check items of interest and return to us for additional information

ComData
We can get you there from here.

7900 N. Nagle Ave.
Morton Grove, IL. 60053
(312) 470-9600

New York
212/267-3696

Los Angeles
213/624-0550

member of IDCMA

name ____
company ____
street ____
city ____ state ____ zip ____
telephone ____ ext. ____

Unit Replaces DG Dasher

TUSTIN, Calif. — A terminal said to be a plug-compatible replacement for the Data General Corp. Nova Dasher 6053 and featuring user- or host-programmable function keys has been announced by General Terminal Corp.

The GT-100/D offers line graphics, smooth scroll, user-settable clock and a bidirectional printer port, the company said. Each function key can be programmed with any combination of up to 48 characters, codes or graphics symbols, the vendor claimed.

With delivery time of 30 to 45 days, the GT-100/D is priced at $1,595 from General Terminal Corp., 14831 Franklin Ave., Tustin, Calif. 92680.

Takes 32 PTS-2000s

Raytheon Controller Rivals 3274

NORWOOD, Mass. — Up to 32 Raytheon Data Systems Co. PTS-2000 intelligent CRT terminals can be clustered under a controller the vendor has just introduced.

The unit is reportedly an alternative to the IBM 3274 controller. It provides binary synchronous communications (BSC) at line speeds up to 9,600 bit/sec.

Models providing Systems Network Architecture (SNA) and Synchronous Data Link Control (SDLC) are available.

The R2074 Large Cluster Controller is a microprogrammed unit containing a minifloppy diskette drive, which is used to load either the emulator or configurator program. It functions as a stand-alone unit.

Interactive Dialogue

After loading the configuration program, the user conducts an interactive dialogue with the system to enter information regarding the physical configuration of the cluster and logical address assignments.

The system then down-line loads relevant information to each of the intelligent terminals comprising the PTS-2000 cluster. Configuration changes can be made by the user.

The R2076 Small Cluster Controller is field-upgradable to the large cluster configuration by the addition of a converter unit (R2064).

This capability provides user flexibility in designing and expanding equipment and configurations as requirements change without physical swap-out of installed equipment, the vendor claimed.

The R2074 costs $6,320; the R2076, $2,850; and the R2064, $3,470, the vendor said from 1415 Boston-Providence Tnpk., Norwood, Mass. 02062.

Distributed DP Seen Far Off

(Continued from Page 61)

fail to deliver on schedule three times out of 10.

Hughes reckoned that a user should expect to wait eight to 10 weeks for delivery of interstate private lines and six to eight weeks for delivery of intrastate private lines. Hughes said users could expect a percentage of their lines to be delivered in defective condition and cost per line to jump to nearly twice as much as the cost initially quoted.

Phone companies will not make it easy for users to bypass the public-switched network, Hughes said, although private lines are critical to decentralized DP at many user organizations.

The Yankee Group's Dale Kutnick told the session that IBM's dominance in total DP sales will depend on dominance in sales of systems for distributed DP.

Although the emerging H Series of IBM mainframes is important to the vendor's future, the Yankee Group's market research director said systems such as the 4300 series and 8100 could prove more important because of their value to distributed processing users under the systems network architecture.

Converter Backs BSC, SNA 3270

(Continued from Page 61)

appear as supported devices to the host, a spokesman said.

It supports several terminals including the Digital Equipment Corp. DEC VT-52 and VT-100, IBM 3101, Lear Siegler, Inc. ADM-3, Hewlett-Packard Co. 2621, Televideo, Inc. 912 and 920 and Informer, Inc. 304.

The system consists of a series of function modules and links that interpret commands from the IBM host and format the screen of the asynchronous CRT terminal so that it appears as a 3270-type device. As data is transmitted from the host, it enters a write module in the CA12-TCP.

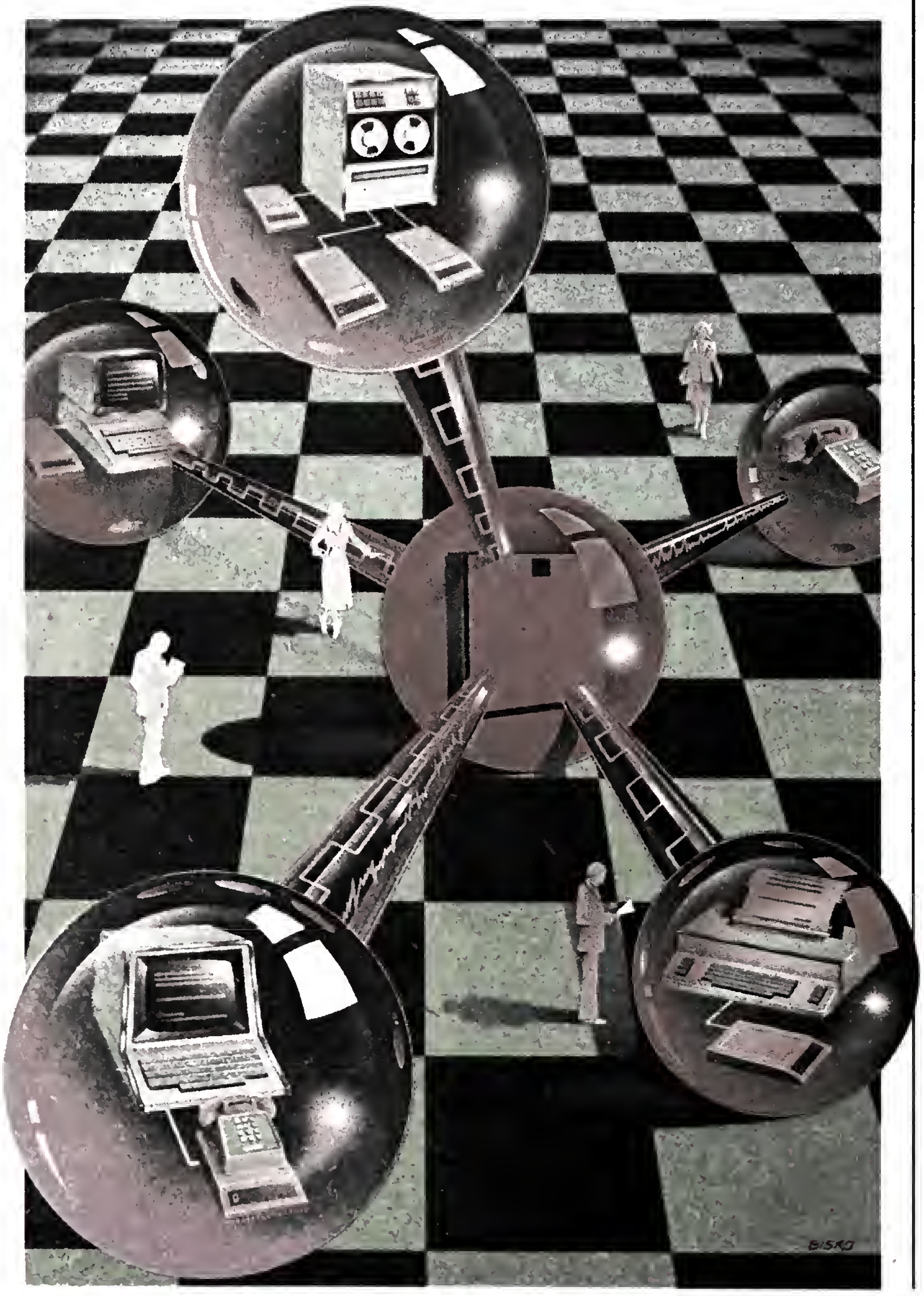
This in turn updates the virtual screen module, an internal screen buffer. A screen manager interprets the virtual screen in accordance with the characteristics of the asynchronous terminal and transmits data to the terminal.

The price for the product ranges from $4,300 to $8,100, depending on the number of terminals supported, the vendor said from 196 Broadway, Cambridge, Mass. 02139.

If EDP means more to you than CBX, we have some news for you.

A ROLM® CBX is a computerized business telephone system, and it's the heart of today's most advanced voice and data communication systems. With the new ROLM Data Communications feature, the CBX can play an important role in your future.

The ROLM Data Communications feature allows you to have a data termination wherever there's telephone wiring. Your terminals and other peripherals can be located and moved as easily as a phone. *Internal* data communications cease to be limited by the transmission speed of your modem. *External* data communications become more efficient and cost-effective. And, you can add data communications to your digital ROLM CBX now or later, incrementally as needed.



It's a smart approach to increase productivity and reduce costs in program development, time-sharing, communication between word processing units; data entry, message switching and all those applications that require asynchronous data switching.

Start talking now with the person in your company responsible for the telephone system. Make sure that your options for the future aren't limited by an analog phone system that's limited. If your company is planning to "upgrade" with a Bell system, you may find yourself locked out of digital flexibility for a long time.

Find out more. A series of seminars will be held throughout the U.S. to introduce you to the CBX and the future of integrated voice and data communications. Call your local ROLM distributor for the schedule in your city, or call us at (800) 538-8154* extension 3039, toll free.

More than just talk. Data.

ROLM Telecommunications

4900 Old Ironsides Drive, M/S 525
Santa Clara, CA 95050

Sales and Service in 141 cities, internationally

*Alaska, California and Hawaii residents call (408) 988-2900, ext. 3039.

Two Intelligent Graphics Terminals Join Tektronix 4010 Series

BEAVERTON, Ore. — Tektronix, Inc. recently unveiled two intelligent graphics terminals that are part of a series of machines for applications ranging from low-end computer-aided design to sophisticated engineering and scientific areas.

The top-of-the-line Model 4114 features a built-in microprocessor and a 19-in. high-resolution direct view storage tube (DVST). The terminal also features refresh and local redraw capabilities and a firmware option that allows the system to have color-enhanced refresh for increased contrast.

Designed to relieve the host processor of graphics chores, the 4114 can retain picture segments — made up of image components — that are made up of groupings of MOVE and DRAW commands. Once formulated by the host processor, these segments can be stored in the 4114's memory, recalled and manipulated manually. Commands are sent down from the host processor to form such stored pictures as transistor diagrams and printed circuit board designs, the spokesman explained.

The 4114 graphics display reportedly operates at 19.2K bit/sec, has an RS-232 interface and can handle up to two 512K-byte floppy disk drives and from 32K- to 1M bytes of memory.

The high-end graphics processor is compatible with the firm's 4010 terminal series and can be plug-to-plug connected with the company's printers, digital plotters and other RS-232 devices. The unit also supports Tektronix's Plot-10 Interactive Graphics Library and applications programs based on the Plot-10 Terminal Control System.

The Model 4112 graphics terminal is an intelligent raster graphics machine and has considerably less visual definition than the Model 4114.

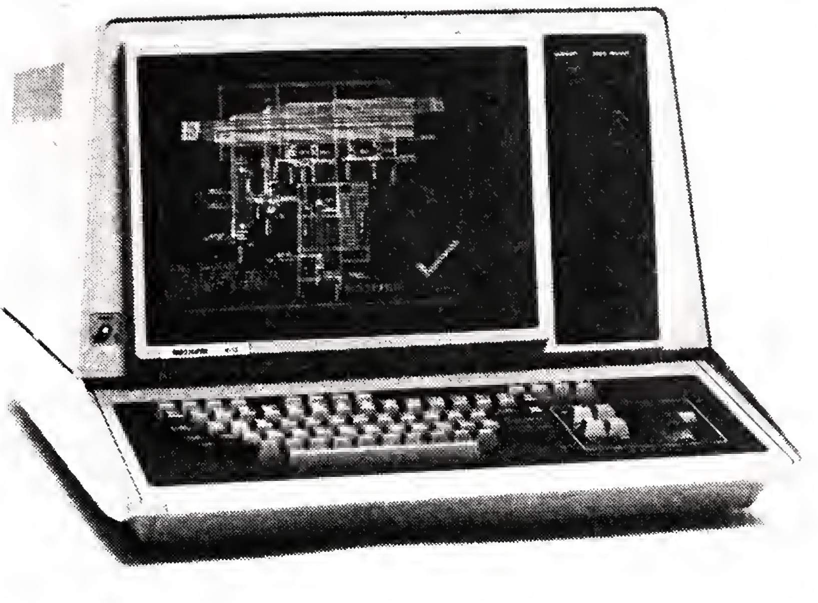
Like the 4114, the 4112 can retain picture segments — relieving the host processor, and can also perform two-dimensional transforms, including translations, rotations and scalings.

However, the 4112 only has 16 view ports as opposed to the 4114's 64, can accommodate only one 512K-byte floppy disk and supports up to 640K bytes of memory. In addition, the unit operates at a slower sustained transmission of alphanumerics and graphics: 9,600 bit/sec.

Base price for the 4114 is $17,500 or $19,500 with the advanced two-color Option 31. The 4112 sells for about $9,600. OEM discounts are available.

Both devices are scheduled to be shipped from six to eight weeks from today, the spokesman noted.

Tektronix may be reached through P.O. Box 500, Beaverton, Ore., 97077.



The Tektronix 4112

Microtec Package Supports APL Set

SAN DIEGO — Microtec, Inc. has announced software to support the APL character set on its MT-80S dot matrix printers.

Called MT-80S-APL, the package features a full overstrike capability and full compatibility with the Volker-Craig Ltd. VC 415APL terminal. Users may switch between APL printing at 10 char./in. and 96-char. Ascii printing at 5-, 10- or 15 char./in., the vendor said.

A kit to retrofit existing MT-80S printers costs $170, the vendor said from 9514 Chesapeake Drive, San Diego, Calif. 92123.

NEW DISCOUNTED TERMINALS

LIMITED OFFER GOOD WHILE SUPPLY LASTS!

	Cash in Advance
Diablo Model 1650 KSR	2495
Diablo Model 1650 RO	2750
Diablo Model 1640 KSR	2395
Diablo Model 1640 RO	2045
Diablo Model 630	2100
TeleVideo 920	Call
TeleVideo 912	Call
DEC LA120	1995
DEC LA34 DA	985
DEC VT100	1495

Freight Collect

The Discount King
P.O. Box 278, Union City, CA 94587
CALL (415) 638-3372 or 638-3536

PARKER BUSINESS SERVICES

THE DATA COMMUNICATIONS CONNECTION

We would like to talk to you about reliable data communications equipment. About immediate delivery. About dependable service and maintenance.

Let's talk about your special requirements. About how we can best utilize available resources. And about a competitive price.

At PARKER BUSINESS SERVICES, we can offer the best from PENRIL, MULTI-TECH, DIGITAL, TEXAS INSTRUMENTS, TELETYPE and EDGE TECHNOLOGY. Let's talk about a communications link that will be effective and cost efficient.

Terminals, modems, TWX, Telex, multiplexers or couplers: communications equipment is our specialty. That's why we like to think of ourselves as "The Data Communications Connection."

Make the Connection: Call PARKER Today!

PBSI
PARKER BUSINESS SERVICES, Inc.
DATA COMMUNICATIONS DIVISION
1740 West Ogden Avenue
Downers Grove, Illinois 60515

NATIONAL WATTS LINE: (800) 323-2407 (Outside Illinois) *
Chicago: (312) 852-5500 * Los Angeles: (714) 871-3700 *
New Jersey: (201) 225-0872 * New York: (800) 526-7586 *
Philadelphia: (800) 526-7586 * Seattle: (206) 771-6442 *
Tampa (800) 323-2407.

FSO/CICS

Full Screen Output
For the CICS User

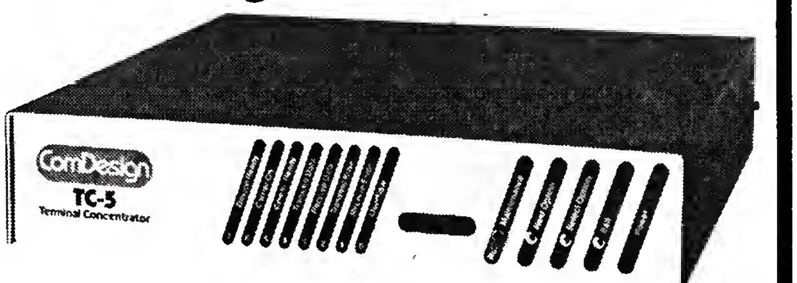
- *SPOOLED INPUT/OUTPUT REVIEW*
  Scroll, Search for a character string, Page, Set reference points, Delete, Requeue or Print.
- *STATUS COMMANDS*
  Display active jobs, Jobnames on queues, Detailed information about active Jobs or Partitions.
- *DATA SET UTILITIES*
  Perform IBM IEHPROGM facilities on line.
- *ALTER/DISPLAY FUNCTIONS*
  Display or alter virtual storage, Display TCB's, UCB's, Locate modules in LPA or JPAQ and resident SVC's, Express CANCEL a TCB.

TONE Software Corp.

Call or Write for Details

1124 N. GILBERT
ANAHEIM, CA 92801
(714) 991-9460
TELEX 181-592

Bring it all together



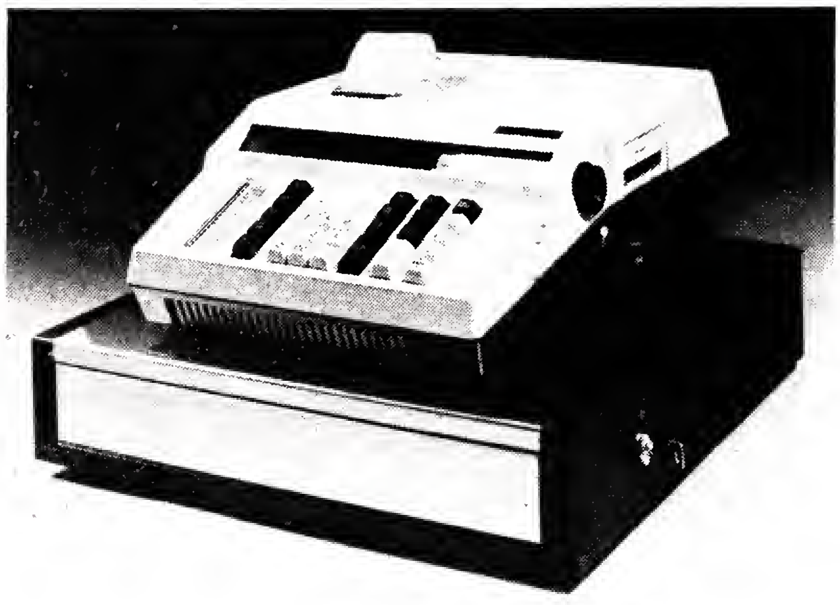
With our new TC-5 Terminal Concentrator
The advanced, easy to use statistical multiplexer for up to 16 asynchronous terminals, over a single telephone line

- ■ STATISTICAL MULTIPLEXING
  Efficiencies to 400 %
- ■ COMPLETELY TRANSPARENT
  No hardware or software changes
- ■ ENHANCED STANDARD FEATURES
  Fully supports dial-up modems, Break, Autobaud, ECHOPLEX, and auto-restart
- ■ EXCEPTIONAL FLEXIBILITY
  Configure each port separately to ANY popular baud rate, character format, flow control, etc.- while other ports are active !
- ■ PRDVEN RELIABILITY
  TC-5s are in use world-wide
- ■ EXCELLENT SAVINGS
  The cost-effective solution to your communications needs
- ■ ELIMINATES ERRDRS
  Fully automatic error correction
- ■ COMPREHENSIVE DIAGNDSTICS
  Automatic self-tests, modem loop-back, and built-in error counters
- ■ FAST, FRIENDLY PRDGRAMMING
  Program all parameters from either unit, using only the English display and three front-panel buttons-ALL in just seconds !
- ■ BUILT- IN SYSTEM MONITORS
  Real-time signal and data displays

For further information and the sales office for your area
Call **toll-free (800) 235-6935** or in Calif. (805) 964-9852

ComDesign

ComDesign, Inc.
340 South Kellogg Avenue
Goleta, California 93117



Model 1031 Transactor

Data Capture Terminal Includes Printer, Tape Drive, LED Display

MONTGOMERYVILLE, Pa. — A programmable data capture terminal including integral printer, tape cartridge drive, LED display and keyboard is available from Transaction Management, Inc.

The Model 1031 Transactor has two-way data communication allowing polling and the transmission of printed messages and price look-up information from the home office to branch offices, the vendor claimed.

The product handles the following store transactions: sales, refunds, layaways, stock transfers, inventory, payroll, bank deposits and price changes.

It costs $2,900, the vendor said from 100 Keystone Road, Montgomeryville, Pa. 18936.

Mux Handles 16 Channels Full-Duplex

WEST BOYLSTON, Mass. — A 16-port, light-wave data multiplexer that reportedly multiplexes up to 16 RS-232C data channels in asynchronous or synchronous formats for full-duplex transmission over a pair of optical fibers is available from Valtec Corp.

The LDM-9500 is configured to provide full protection, the vendor claimed. The electro-optical transmission system, including the fiber-optic cable, is protected with a redundant hot standby transmission system, a spokesman said.

The product features asynchronous data rates to 19.2K bit/sec and synchronous operation to 64K bit/sec, he added.

Built-in features include standard diagnostic and visual indicators, which allow monitoring of both channel and system status. The multiplexer also accepts the EIA 25-pin electrical plug as input and converts directly to optical digital transmission.

The price is $6,000 for the 16-port, fully protected version, the vendor said from 99 Hartwell St., West Boylston, Mass. 01583.

Qwint Unveils Printer, Terminal

NORTHBROOK, Ill. — Qwint Systems, Inc. has added a printing terminal and a teleprinter to its product line.

The KSR-743 printing terminal is a fully featured keyboard printing terminal with a standard RS-232 interface. The machine can be configured from a keyboard for such characteristics as transmission rates, data pacing, disconnect and 20-char. answer-back, the vendor said.

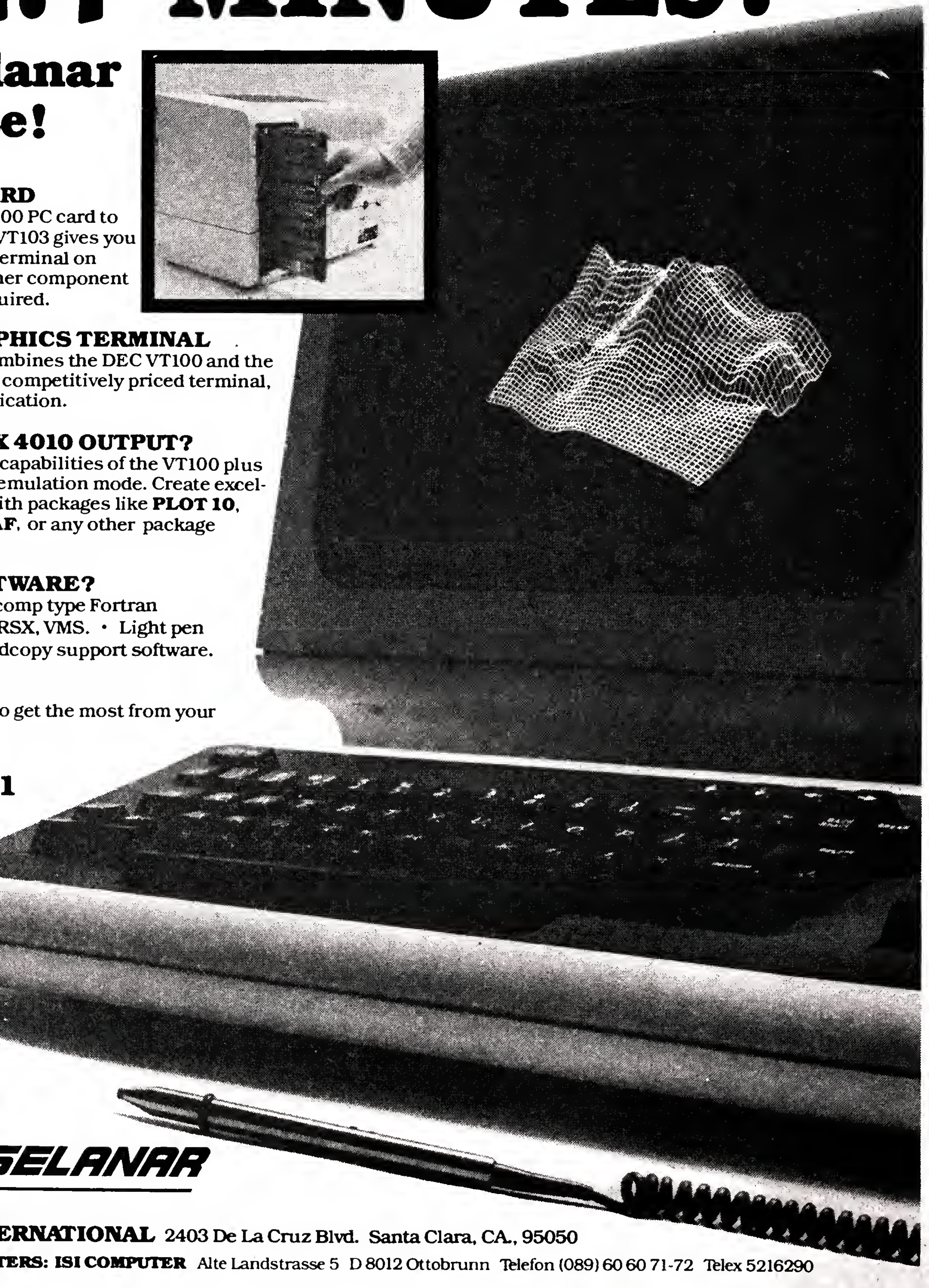
The firm's teleprinter, the KSR-744, features an internal 103-style modem that is intended for direct telephone connection via a modular jack.

Qwint also announced the RO-743 receive-only terminal that features a multicopy facility, extended printhead life and a ribbon cartridge, the vendor said.

The KSR-743 costs $995, the KSR-744 costs $1,195 and the RO-743 costs $795, the vendor said from 3693 Commercial Ave., Northbrook, Ill. 60062.

VT100 GRAPHICS IN 4.4 MINUTES!

From Selanar Of Course!



SIMPLY ADD A CARD
Adding the Graphics 100 PC card to your existing VT100 or VT103 gives you the most versatile CRT terminal on the market today. No other component or CRT changes are required.

OR BUY OUR GRAPHICS TERMINAL
The Selanar GT100 combines the DEC VT100 and the Graphics 100 into a very competitively priced terminal, designed to fit your application.

NEED TEKTRONIX 4010 OUTPUT?
Our GT100 has all the capabilities of the VT100 plus our new Tektronix 4010 emulation mode. Create excellent graphics displays with packages like **PLOT 10**, **DISSPLA & TELAGRAF**, or any other package with 4010 output mode.

HOW ABOUT SOFTWARE?
Selanar supplies • Calcomp type Fortran subroutines for: RT-11, RSX, VMS. • Light pen support software • Hardcopy support software.

CALL US!
Let us show you how to get the most from your computer terminals.

(408) 727-2811

ISI SELANAR

ISI SELANAR INTERNATIONAL 2403 De La Cruz Blvd. Santa Clara, CA., 95050
EUROPEAN HEADQUARTERS: ISI COMPUTER Alte Landstrasse 5 D 8012 Ottobrunn Telefon (089) 60 60 71-72 Telex 5216290

Replaces I-8100 Series

NCR Unveils I-9000 Small Business Line

DAYTON, Ohio — NCR Corp. has announced a line of interactive direct processing systems that replaces its I-8100 line of small business systems.

The I-9000 series consists of four basic models ranging from the entry-level I-9010 to the top of the line I-9050, a 32-bit minicomputer that reportedly rivals Digital Equipment Corp.'s VAX, Data General Corp.'s MV800 and Perkin-Elmer Corp.'s 3200 processors.

The desktop I-9010 is an 8-bit processor that offers a main-memory range from 64K bytes to 256K bytes in 32K-byte increments. It also features a processor cycle time of 600 nsec, the firm said.

LSI-Based Processor

The I-9020 is a 16-bit processor based on large-scale integration (LSI) technology. It offers a main memory range from 64K bytes to 512K bytes, also in 32K-byte increments.

Processor cycle time is 250 nsec and the system can be configured with one low-speed peripheral interface with a 40K byte/sec transfer rate, two integrated disk controllers and up to 24 integrated communication lines, the vendor said.

The mid-range I-9040 is a 16-bit virtual-memory processor that offers between 256K bytes and 2M bytes of main memory, available in 256K-byte increments. The processor sports a 112 nsec machine cycle time and will accommodate up to four I/O subsystems. The subsystems can be configured in any combination of low-speed peripheral interfaces with a maximum of three very high-speed peripheral interfaces at 1.2M byte/sec transfer rates, one disk-integrated disk controller and from one to 20 integrated communication lines, NCR said.

The top-of-the-line I-9050 is a 32-bit processor that uses the same bus architecture as NCR's larger V-8500 systems. It is a virtual memory processor offering between 512K and 3M bytes of main memory, available in 512K-byte increments. Processor cycle time is 84 nsec, or 56 nsec with an optional performance feature. A fully configured system includes two low-speed peripherals, six very high-speed peripherals, two integrated disk controllers and up to 20 integrated communication lines, the vendor said.

The NCR I-9040 Virtual Memory System

The processors are not field upgradable. However, software is transportable. An upgrade for the 9010 to the 9020 requires a processor change and new peripherals. It also means users have to migrate from the 9010's IDPS operating system to either the IMOS III or IMOS V operating systems on the 9020. Migration from the 9020 to the 9040 requires a processor change, a migration to the IRX operating system. Migration from the 9040 requires only a processor change. The peripherals and operating system are compatible with the 9050, NCR said.

The 9010, with 64K bytes of main memory, 1M bytes of disk storage, a 70 line/min printer and one CRT terminal costs $15,125.

A 9020, running the smaller IMOS III operating system, with 96K bytes of main memory, 20M bytes of hard-disk storage, a 70 line/min printer and three CRT terminals costs $43,890, NCR said.

The same system with the IMOS V operating system, 256K bytes of main memory, 135M bytes of hard-disk storage, a 300

(Continued on Page 68)

Atex Newspaper System Suits Medium-Sized Papers

BEDFORD, Mass. — Atex, Inc. has introduced an electronic newspaper publishing system aimed at medium-sized daily newspapers.

The System 7000 will support up to 64 newsroom and advertising terminals on a shared data base, and remote terminals and newsrooms can be linked via telecommunications to the central production site, according to the vendor.

The system is available in three basic configurations, each with at least two processors for 100% backup. The configurations are built upon the Atex Copy Management Processor (CMP), proprietary hardware and software that reportedly ensures complete data base reliability.

The system's Copysafe redundancy method records backup copies using two independent computers and two independent disk controllers, connected by the CMP, the spokesman explained.

Prices for the system start at $250,000, depending on configuration and options. Atex is located at 15 Wiggins Ave., Bedford, Mass. 01730.

A Way to Keep Computers on the Right Track

The Beall Channel Switch. Lets you switch critical on-line services to another CPU when failure occurs. Allows specific peripherals to serve more than one computer. Redrives all CPU signals to give you far more flexibility for physical placement of peripherals.

And Beall does all of this less expensively, more reliably and with less opportunity for operator confusion than anyone else.

We make five basic models to provide up to eight switchable interfaces each of which can be logically connected to as many as eight CPUs.

Want to track down more facts? They're in our new brochure. Write or call for it today.

John Beall & Company, Inc.
9103 Third Avenue ▪ North Bergen, N.J. 07047 U.S.A. ▪ 201/854-3562

THESE TAPE DRIVES KEEP YOU FROM GOING AROUND IN CIRCLES.

DATUM MADE'EM.

Made 'em all possible.

Because nowhere in the world can you get quality tape drives like these from a single source. And nowhere else can you find the kind of overall service and support that makes dealing with Datum such a satisfying and profitable experience.

HOW DATUM DOES IT.

It's a simple story really. It's a story of three types of families. Tape families.

First comes the Tension Arm from 12.5 IPS to 45 IPS. With a choice of 800 NRZ. 1600 P.E. And 800/1600 Dual Density Bits Per Inc. (BPI).

Next comes the Vacuum Column from 75-125 IPS with 800, 1600 or 800/1600 BPI.

And thirdly come the Streamers. These come with 25 IPS start/stop to 100 IPS streaming and 1600 BPI. This family is an extremely cost-effective back-up to Winchester disk drives.

And to make the family portrait complete, Datum offers the widest selection of tape controllers to complement your tape drive. And provides you with a complete tape system. All from Datum: the single source.

WE'RE PROUD OF OUR ENTIRE FAMILY.

Proud of our product and proud of our people. Because no other company provides you with the breadth of product line nor the level of service that Datum does. And no other company takes the kind of pride we do in making sure our customers really get their questions answered and their problems solved.

In fact, we back up every purchase. And you've got more than just our word on that. Because we always guarantee you total service from full technical and application assistance to on-site installation. And our maintenance programs service all Datum products. It's all part of the way Datum does it.

We're not trying to run circles around you, we're just trying to keep you from going around in circles.

Just call us and see.

Datum, Inc., Corporate Headquarters: 1363 South State College Blvd., Anaheim, California 92806, Telephone: (714) 533-6333, Ext. 207, TWX: (910) 592-1289, Telex: 68-5579.

Toll Free: 800/854-4600 (Outside California)

datum
Storage Systems Division

Burroughs Brings Out Document Encoder

DETROIT — Burroughs Corp. has introduced a high-speed S590 document encoding machine that reportedly encodes documents for electronic reading by other machines for automatic entry of data into computers.

The S590 is a single-pocket encoder that can encode documents in either magnetic ink character recognition (Micr) or optical character recognition (OCR) type fonts.

The principal Micr use of the new system will be in proof-of-deposit operations that prepare Micr-encoded documents for subsequent electronic processing.

The system also will be applied to proof and receipting operations involving OCR-encoded utility bills, insurance premium notices, credit card slips and loan coupons.

The S590 requires 42% less power and produces 55% less heat than previous systems, according to Burroughs. Its control system is based on microprocessor technology and utilizes programmable read-only memory (Prom). This provides the machine with a Micr/OCR code line with from one- to eight fields, the vendor said.

Program Variability

The Prom program sequences the encoding operation automatically. It also contains two independent sets of parameters that allow altering of the machine's operation to satisfy the particular need for each user, the vendor spokesman said.

There is an electronically buffered, standard 10-key keyboard that stores both numeric and control information for up to 21 print positions.

Based on the Prom program, fields are encoded in a controlled index sequence on the S590. Documents are transported through the new encoder at 75 in./sec.

The basic S590 with Micr capability costs $7,790 and leases for $261/mo on a three-year contract. Deliveries are expected to begin in the second quarter of 1981, the vendor said from One Detroit Place, Detroit, Mich. 48232.

Conversion Unit Fits IBM CPUs, Amdahl Units

MIDDLETOWN, N.Y. — A Frequency Converter for IBM and Amdahl Corp. computers is now available from K/W Control Systems, Inc.

The latest addition to the firm's Piller line of 415 Hz frequency converters is said to have an efficiency rating of more than 90%, reportedly requires less space per KVA than the 75 KVA model and may be installed directly in the computer room.

The Silentblock model has a low noise level of 63 db. As with the 75 KVA model, the 190 KVA 415 Hz unit offers a half-second power failure ride-through capability to protect against power outages, voltage sags, brownouts and other power line disturbances.

The unit is available with a full parts-and-labor maintenance contract that includes direct telephone computer maintenance analysis capability. Cost of the contract for the 190 KVA unit is $2,500 per unit. Prices for the 190 KVA model are $55,000 for the standard model and $65,000 for the Silentblock model.

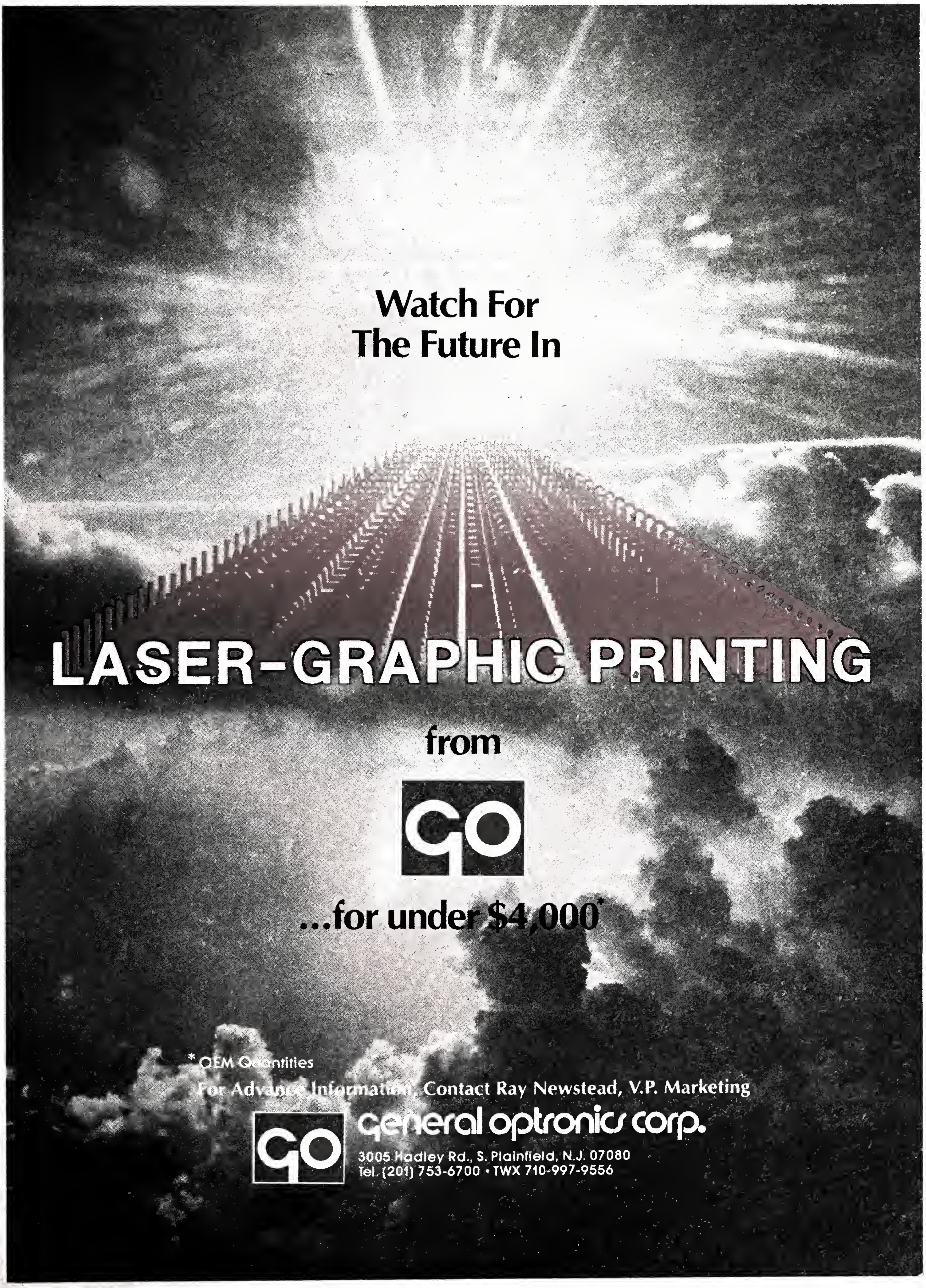
K/W is located at S. Plank Road, Middletown, N.Y. 10940.

Terminal Takes Voice/Data Input

SUNNYVALE, Calif. — Heuristics, Inc. has announced a voice/data input terminal and has expanded the vocabulary on all its commercial and industrial voice products from 64- to 128 words.

The voice input terminal, the Model 5300, combines the speech recognition capabilities already announced in the firm's Model 5000 circuit board with the Lear Siegler, Inc. ADM-5 terminal, the vendor said.

The Model 5300, with the expanded vocabulary capability, costs $3,925, the firm said from 1285 Hammerwood Ave., Sunnyvale, Calif. 94086.


Watch For
The Future In
LASER-GRAPHIC PRINTING
from
GO
...for under $4,000*

* OEM Quantities
For Advance Information, Contact Ray Newstead, V.P. Marketing
GO general optronics corp.
3005 Hadley Rd., S. Plainfield, N.J. 07080
Tel. (201) 753-6700 • TWX 710-997-9556

NCR Offers I-9000 Series

(Continued from Page 65)

line/min printer and five CRT terminals costs $70,360.

A 9040 processor with 512K bytes of main storage, 135M bytes of hard-disk storage, a 720 line/min printer and four CRT terminals costs $96,450.

The 9050 with 1M byte of main storage, 486M bytes of hard-disk storage, a 900 line/min printer, 15 CRT terminals and a tape drive to back up the fixed-pack disk drive costs $300,530, NCR said.

Volume shipments of the I-9000 line will begin in the second quarter of 1981, and NCR said it will offer more peripherals and software throughout 1981 and 1982.

Bits & Pieces

Book Composition System Outputs in Mixed Fonts

HARTFORD, Conn. — An automated book composition system said to produce photocomposed pages ready for offset printing containing various and mixed fonts has been announced by Matech, Inc.

Input for the ABC System can come from word processing/text editing systems or from data base management systems, the vendor claimed, and printed matter can be produced using laser printers.

ABC programs provide line and page make-up and minimal training and knowledge of typesetting, the vendor claimed.

The ABC System is priced at $40,000 with a $200 monthly maintenance fee from Matech, Inc., 60 Washington St., Hartford, Conn. 06106.

Houston Instrument Plotters Gain Six-Color Pen Option

AUSTIN, Texas — A multipen option featuring six colors to be used on any Houston Instrument, Inc. plotter under program control is being offered by Houston Instrument.

Each multipen changer comes with pens in the colors black, blue, red, green, violet and orange. The color brown may be ordered separately, the vendor said.

The retrofit kit begins at $395 from the firm at One Houston Square, Austin, Texas 78753.

WP Unit Offers TWX, Telex, For Legal, Medical Tasks

DAVENPORT, Iowa — A word processor/computer that can reportedly access external data bases for legal, medical or financial use or that can be used for telex or TWX services has been announced by Archives, Inc.

The Archives II features a detachable keyboard and a green phosphor screen with nonglare shield, the vendor said.

With the addition of dual double-sided disk drives, it gives the user a capability of 7.5K bytes of memory per drive, according to the vendor spokesman.

The Archives II is priced at $7,500 from Archives, Inc., 404 W. 35 St., Davenport, Iowa 52806.

High-Speed Matrix Printers Give WP, Communications

MELBOURNE, Fla. — A line of high-speed matrix printers for word processing, data processing and communications applications has been announced by Florida Data Corp.

The OSP/120 and OSP/130 feature built-in automatic-cut sheet feed, manual feed and tractor feed in one mechanism, the vendor spokesman said.

The printers will also fill line printing requirements in the 300- to 600 line/min range and provide graphics, multifont storage, fully formed characters and labeling in one machine, the company said.

With a delivery time of 60 days, the OSP/120 is priced at $3,900 and the OSP/130 at $4,100, from Florida Data Corp., 600D John Rodes Blvd., Melbourne, Fla. 32935.

Series 5510/5520 Spinwriter Adapted for PDP-11, LSI-11

WINCHESTER, Mass. — An adaptation of the NEC Information Systems, Inc. Series 5510/5520 Spinwriter with plotting software for the Digital Equipment Corp. PDP-11 and LSI-11 has been introduced by Mystic Valley Engineering Co.

According to Mystic, this latest package provides Fortran save file on single- or double-density floppy disks and allows plotting of up to four functions with autoscale of y-axis, adjustable plot size, axis labels and titles.

With a print capacity of 55 char./sec, the unit is priced to sell for $2,990, the vendor said.

Full details are available from Mystic Valley Engineering Co., 85 Beacon St., Winchester, Mass. 01890.

Gerber Model 41 Photoplotter Gives Speeds to 275 In./Min

SOUTH WINDSOR, Conn. — Gerber Scientific Instruments Co. has announced the Model 41 photoplotter.

The unit offers speeds up to 275 in./min and a one-mil accuracy. It features .5 mil repeatability and .5 mil resolution across its 16- by 20-in. plotting area, the vendor said.

The unit costs $57,500, the vendor said from P.O. Box 305, Hartford, Conn. 06101.

TELEX SERIES 80: THE BEST TAPE DRIVE FOR 4300 SERIES PROCESSORS.

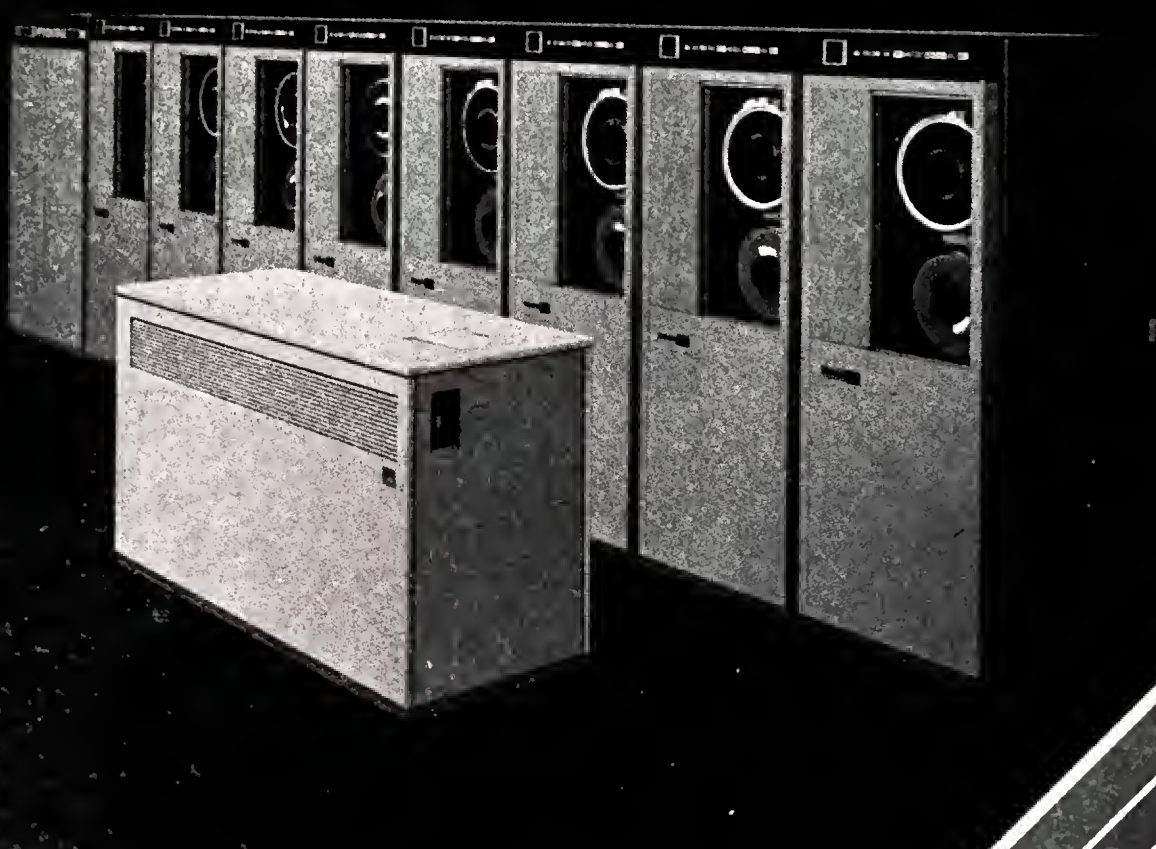
Congratulations. You've upgraded to — or at least ordered — IBM 4300 Series processors to gain major price/performance improvements and environmental enhancements. Now, what about your tape drives?

Telex Series 80 tape drives are the perfect match for 4300 processors. Like the IBM 4300, Series 80 is based on proven technology. It outperforms its competition, and is lower in price.

Series 80 drives offer 6250 bpi (GCR), 1600 bpi (PE) and 800 bpi (NRZI) data formatting — at transport speeds up to 125 ips; all with capabilities beyond those normally required on 4300's and at a price well below IBM's comparable offerings.

Series 80 is smaller and lighter than the IBM 3420 and its equivalents. Five Telex drives fit comfortably in the space normally required by four IBM drives. Series 80 also generates 30% less heat and consumes 35% less power. Patented Telex features like the Supr-Lite Capstan and Telex Tape Path ensure smooth, reliable back-up storage.

For more information on the tape drives made to complement your 4300 processor and other IBM systems, contact your nearest Telex representative. Or call Series 80 Marketing toll-free (800) 331-2623.



The innovation continues... TELEX®

Telex Computer Products, Inc.
Terminals/Peripherals/Data Entry and Word Processing Systems, OEM Products

6422 East 41st/Tulsa, Oklahoma 74135/(918) 627-1111
332 Consumers Road/Willowdale, Ontario M2J1P8/(416) 494-4444

"SEE US AT THE NCC, BOOTH #1653"

Portable Micro Includes Software, CRT Terminal

By Jeffry Beeler

CW West Coast Bureau

SAN FRANCISCO — A processor, industry-standard software, diskette storage and small CRT terminal are all housed together in an Osborne Computer Corp. portable microcomputer system that fits in a carrying case and costs less than $1,800.

Developed by a Hayward, Calif.-based firm founded last year by Adam Osborne, the Osborne I system was formally introduced on the eve of the recent West Coast Computer Faire, where the product made its first public appearance.

The Osborne I is targeted primarily at business and technical managers, professionals and white-collar workers and comes with several widely used software packages that allow the integrated system to double as a number cruncher and text processing/editing station, a company spokesman said.

CP/M Standard

Some of the Osborne I's standard software includes Digital Research, Inc.'s CP/M disk operating system, Micro Pro International Corp.'s Wordstar word processing package and Sorcem, Inc.'s Supecalc electronic spreadsheet.

Wordstar enables users to process, store and edit text for business documents like letters, memos and reports, the spokesman said. The software package also incorporates Micro Pro's Mail-Merge feature, which allows users to sort and print mailing lists and later integrate them with Wordstar-generated correspondence.

For applications involving mostly numbers, the Osborne I's Supercalc package reportedly allows users to create electronic spreadsheets and to do calculations for things like purchase lists, parts-cost lists, accounting worksheets and budget projections.

The Osborne I's CP/M operating system, meanwhile, permits users to gain access to the "thousands" of CP/M-compatible programs, software routines, languages and systems already written and operating out in the field, the spokesman said.

Among its other standard software tools, the system supports both the Microsoft Basic interpreter and the Compiler Systems, Inc. C Basic compiler-interpreter language, the spokesman said.

On the hardware side, the Osborne I incorporates a 4MHz Zilog Corp. Z-80A-based processor with dual 100K-byte mini-floppy diskette units, 64K bytes of random-access main memory, 5-in. display monitor and standard typewriter-like keyboard. All the hardware modules are com-

(Continued on Page 70)

Martha Gephardt, a former trainee who is totally blind, sits at a LED 120 braille terminal in the AEB computer room. She is reading the braille printout.

Course for Blind Programmers Boasts 100% Employment Rate

Special to CW

LITTLE ROCK, Ark. — An institution for the blind here is boasting a 100% employment rate for students of its specialized programming course.

In a year the United Nations has declared The International Year for Disabled Persons, the center has already placed 17 blind and visually impaired graduates in programming positions across the country.

Arkansas Enterprises for the Blind (AEB) started offering a vocational course five years ago on an individual, informal basis and has since added it to its regular curriculum.

Two members of the most recent class of eight graduates have already found employment and the others are currently on the job trail, the firm said.

When the AEB staff began pursuing computer programming as a course offering, a committee of Little Rock area data processing managers was formed to help select appropriate equipment. They chose a Honeywell, Inc. system and in 1977 purchased a Model 6/36 computer with 128K bytes of main memory, a 10M-byte removable cartridge disk and 5M-byte fixed cartridge disk, the firm said.

There are four CRT terminals and two braille terminals which are interfaced with the processor. The only equipment that is not made by Honeywell is a computer that is interfaced with the Honeywell CPU and a LED-120 braille terminal. Messages and data passed back and forth on this unit are pronounced by a voice synthesizer. The blind student can program using the keyboard and voice response from the CPU.

Programming Practice

Approximately 60% to 70% of the total class time in the nine-month course is spent in actual programming practice. During the first week, students listen to introductory material on audio tape. From this they progress to programmed instruction manuals and, as needed, manuals and specialized instructions in braille. They learn the languages of Cobol, RPG and Fortran, AEB said.

Applicants entering the program must meet certain qualifications. They first go through a one-month evaluation period at the rehabilitation center. They not only have to meet qualifications in areas such as mathematics, typing and spelling, but they must also demonstrate their abilities to travel to and from work and to orient themselves to a work environment.

In addition, they must have oral communication skills enabling them to interact verbally and socially with fellow workers and customers.

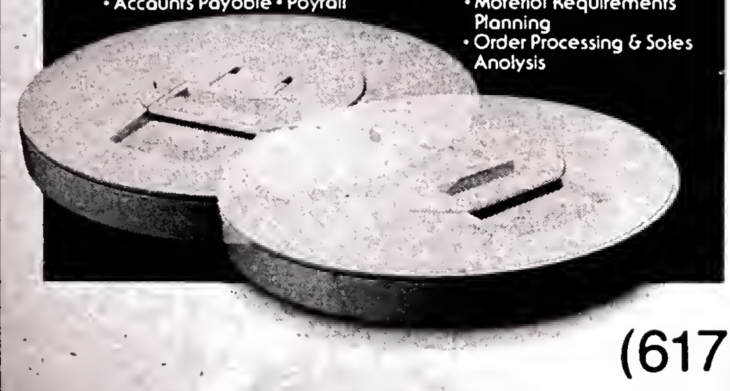
Most important, applicants must score well on a computer programming aptitude battery of five tests. Their scores are "normed" with those of sighted college graduates.

(Continued on Page 70)

Buy a few packages of sheer productivity.

Accounting Packages
- General Ledger
- Financial Planning
- Accounts Receivable
- Accounts Payable • Payroll

Manufacturing Packages
- Inventory Control
- Bill of Materials
- Job Shop Control
- Material Requirements Planning
- Order Processing & Sales Analysis



If you've got a DEC computer, we've got award-winning software packages for it that will put you on-stream fast, with an immediate productivity increase.

We offer a complete line of packages. Not just manufacturing packages. Not just accounting packages. But both. Your people won't have to fight with you — or one another — about incompatibilities, because there aren't any. And no one can get you up and running faster than IMS.

ims INTERACTIVE MANAGEMENT SYSTEMS

(617) 489-3550

375 Concord Avenue
Belmont, Mass. 02178

Please send me literature and prices on your complete line of productivity packages.

Name__________

Title__________

Company__________

Address__________

City_____ State____ Zip_____

Phone (   )__________

CW 4/20

Course for Blind Boasts 100% Job Placement

(Continued from Page 69)

The class meets five days a week and students are expected to work most evenings and weekends. For student evaluation, careful attention is paid to the number of hours spent working on the computer outside of the classroom. The last class had an individual average of 50 hours of extra time for each four weeks of training, the firm said.

The course is adapted to meet the needs of the various impairment levels of the blind and visually impaired students. Students who have high partial vision, but are considered legally blind, can read video terminals, usually at close range.

Those who have low vision and need magnification use closed-circuit viewing systems that enlarge print from the video screen up to 20 times.

The totally blind students use braille texts and instructions and the braille terminal. This terminal embosses all data such as computer messages, editor responses and programs on a continuous fanfold 20 weight paper that the student uses as his printout.

Another alternative for a totally blind person when a braille terminal is not available is an aid called an optacon, an optical scanning device that can read the CRT terminal screen.

It operates by using a camera that moves across the screen or other printed material. An electronic device processes signals from the camera, and the user feels raised, vibrating print passing under the index finger of his hand resting on a tactile array, according to AEB.

To accommodate more students, the Model 6/36 must be upgraded to a Level 6 Model 43. More terminals must be acquired and the memory capacity will have to be doubled to 156K bytes, according to a program spokesman.

The new equipment will allow about 10 more people to be trained at the center in one year, or 40 more in the four-year utilization of the equipment.

Anne Kelly has low vision and is able to read print at close range. She relies on a closed circuit viewing system (behind her) to enlarge print from the CRT screen.

Micro Comes With CRT

(Continued from Page 69)

bined in a single unit that reportedly weights approximately 30 lb.

The keyboard snaps together with the rest of the system to form a waterproof, brushed aluminum carrying case that measures 19 in. by 13 in. by 9 in., the spokesman said.

Other standard hardware features include an RS-232C interface for connecting printers and an IEEE 488 interface for accommodating test and measurement instruments, he added.

Some of the Osborne I's options will include a 9-in. display monitor, three- to five-hour battery pack and modem with acoustic coupler for communicating over the telephone with printers and other processors. Prices and delivery dates for the options have yet to be set.

In its existing configuration, the Osborne I costs $1,795 and will be sold exclusively through dealers and office-equipment suppliers.

Deliveries start in June from Osborne Computer at 26500 Corporate Ave., Hayward, Calif. 94545.

PDP-11® & VAX-11/780® users...

ComDesign's TC-3 Concentrates Multiple Terminals and Printers on a Single Telephone Line Cost-Effectively for the PDP-11 and VAX.

- CONCENTRATION
  Many terminals—one line
- COST SAVINGS TO 40%
  Totally eliminates DZIIs and cables
- PROVEN RELIABILITY
  TC-3s are in use world-wide
- ERROR CORRECTION
  Data checked with all errors eliminated automatically
- STATISTICAL MULTIPLEXING
  Efficiencies to 400%
- FAST ECHO RESPONSE
  —at last !
- BUILT-IN SYSTEM MONITORS
  Real-time data and signal displays
- POWERFUL DIAGNOSTIC PANEL
  Modern loop-back, unit self-tests, and terminal diagnostics

Put a TC-3 on Your UNIBUS® and Get a DZ11 with Stat Muxing too!

For further information and the sales office for your area
Call **toll-free (800) 235-6935** or in Calif. (805) 964-9852

ComDesign

ComDesign, Inc.
340 South Kellogg Avenue
Goleta, California 93117

® Registered Trademarks of DEC

Go APE for Diablo, Lear Siegler, and TeleVideo!

As a New Authorized Distributor for Diablo, Lear Siegler and TeleVideo, we're determined to offer you the best combination of price and delivery on the purchase or lease of terminals.
Call (415) 461-0894

We also offer other CRTs and printers:
DEC • Hazeltine • Control Data •
TI • Epson • Teletype

American Peripheral Exchange
900 Larkspur Landing Circle, Suite 240
Larkspur, CA 94939

Go APE - Buy American

In 1920, the Russians built a railroad stretching 5,864 miles.

In 1976, Micropolis produced a 96/100 TPI 5-1/4 inch floppy disk drive.

No one had ever seen so many tracks before.

MICROPOLIS™

In the U.S.: 21329 Nordhoff Street,
Chatsworth, CA 91311 • 213/709-3300.

UP & RUNNING WITH TERMINALS

MODEL	PURCHASE PRICE	ANNUAL SERVICE	12-MONTH LEASE w/SERVICE
TI 745	$1595	$240	$ 90
TI 765	2695	336	135
TI 785	2345	324	120
TI 787	2795	324	145
TI 810	1795	348	105
TI 820	2065	360	115
LA 34	1095	198	65
LA 120	2495	330	135
VT 100	1795	187	95
Visual 100	1550	187	80
Visual 200	1050	180	60
GE 2030	1450	230	72
Diablo 630 RO	2430	363	120
Diablo 1640 KSR	2925	363	160
Diablo 1650 KSR	2995	363	165
H.P. 2621 A	1595	187	95
H.P. 2621 P	2750	312	165
Memorex 2078	2552	198	79
ADM-3A	850	180	50
ADM-31	1370	286	75
ADM-5	965	180	55
Rixon 212A	945	82	50

DASI—Your single source nationwide for computer peripheral sales, leasing, rentals, local 24-hour service, stocking and supplies. Quantity discounts and COD discounts available.

Corporate Offices: Cole Rd. & Camden Ave., P.O. Box 1230, Blackwood, NJ 08012. **(609) 228-0700.** Toll Free **(800) 257-7748.** In New Jersey, **(800) 232-6510.**

District Offices: Atlanta-(404) 449-5435. Austin-(512) 474-9643. Boston-(617) 769-6420. Chicago-(312) 967-0440. Cincinnati-(513) 793-9714. Cleveland-(216) 473-2131. Dallas-(214) 256-5536. Denver-(303) 741-2922. Detroit-(313) 589-1409. Hartford-(203) 674-1697. Houston-(713) 682-5965. Los Angeles-(213) 618-0400. Milwaukee-(414) 963-9008. Minneapolis-(612) 854-4466. New Jersey-(201) 227-8880. New York City-(212) 564-9301. Orange County-(714) 979-2157. Philadelphia-(215) 667-8315. Phoenix-(602) 263-5034. Portland-(503) 644-8600. Rochester-(716) 377-2080. St. Louis-(314) 576-2804. San Antonio-(512) 655-3274. San Francisco-(415) 872-1811. San Jose-(408) 244-3772. Seattle-(206) 251-5070. Washington, DC-(301) 459-3377.

DAS
DATA ACCESS SYSTEMS, INC

'Japan, Inc.': Reality or Myth?

By Bob Johnson
CW New York Bureau

NEW YORK — Is "Japan, Inc." a reality or is it a myth created by worried and perhaps jealous American businesses?

That and other questions were raised at a recent seminar on "The Japanese Invasion of the U.S. Computer Industry" held here by the American Institute for Professional Education.

The panel of speakers included representatives from computer and semiconductor manufacturers, scientific consulting firms and a Japanese consulting company. They hammered out their differences and aired their opinions, but the discussion was often heated.

Although opinions on such matters as trade reciprocity, government regulations on tariffs and the funding of Japanese technology by the Japanese government differed sharply, the general consensus was that American business must rethink its management philosophies if it is to compete successfully with the new and constant wave of Japanese technology.

Look to Future

One major reason for Japan's succeeding in the U.S. is that the Japanese look toward the future for success. Japanese industry is so closely allied with its national banks that it can afford to forego immediate profits in favor of long-term returns, observers said.

The groundwork for the current influx of Japanese technology was laid in the '70s, according to C. Oakley Mertz, vice-president of the Gartner Group. The Japanese style of business centers around long-term planning, which includes at least 10 years of observance and investment oriented toward capturing a substantial share of a market. And, Mertz said, "the years of waiting can pay off with rapid growth."

The Japanese have been eyeing the American computer industry for nearly 20 years, at least since the '60s, Mertz said.

They have, in fact, modeled themselves on successful U.S. computer companies. "Fujitsu [Ltd.] today is a lot like IBM was in the '50s and '60s as far as company spirit goes," Mertz said. "Its

(Continued on Page 77)

Cites Duplication of Effort

CDC Head Urges Semi Research Venture

By Marcia Blumenthal
CW Staff

PALM SPRINGS, Calif. — Research dollars that could be better spent on developing creative applications for state-of-the-art semiconductor technology are being wasted by leading computer industry companies because they are duplicating basic microelectronic technology.

Rather than continue to waste precious resources, both human and financial, the industry should establish a joint venture for basic semiconductor research, urged Robert M. Price, president and chief operating officer of Control Data Corp. Price's proposal appealed to many executives attending the annual meeting of the Computer and Business Equipment Manufacturers Association (Cbema) at this desert paradise recently, but questions about the logistics of establishing such a venture prevailed.

Worldwide, all applications of semiconductors consume nearly $7 billion in research and development annually, Price noted. Duplication of technology probably runs to the tune of more than $1 billion a year.

"Everyone is out there duplicating their equally inadequate expenditures in the area of semiconductors when they need every dollar possible to achieve value-added distinctiveness for their products and services which are based on those devices," Price charged during the conference's keynote session.

(Continued on Page 74)

Challenge of the Decade

PALM SPRINGS, Calif. — Solving the office automation dilemma is one of this decade's major challenges, insisted Harold E. O'Kelley, president and chief executive officer of Datapoint Corp.

However, integrating the office into the mainstream information processing function of the organization is five to 10 years in the future, keynote panelist O'Kelley told executives gathered here recently for the annual meeting of the Computer and Business Equipment Manufacturers Association (Cbema).

"It is difficult to solve the complexities of the office without a systems approach," O'Kelley maintained.

However, no two corporations have the same problems, so vendors must provide systems that are easy to alter. These changes will be accomplished through software.

The user must plan for the change to an automated office

(Continued on Page 74)

CW Photo by M. Blumenthal

Datapoint's Harold E. O'Kelley and CDC's Robert M. Price exchange thoughts on the podium at the recent meeting of the Computer Business Equipment Manufacturers Association.

The Racers Are Here!

TI's 780 Series Breaks All Track Records.
4 Times Faster.

NEW!!! 785/787 portables, 783 KSR and 781 RO. Featuring speedy 120 character-per-second thermal printing.

Call 201 376-4242 or nearest Westwood office

Sales
Leases
Service

Also stocking ADDS, IBM, Hazeltine, Hewlett Packard and Perkin Elmer CRTs. Decwriters. Diablo daisy wheel printers. Sykes floppy disks. Vadic and Anderson-Jacobson modems and couplers.

TEXAS INSTRUMENTS TERMINALS IN STOCK IMMEDIATE DELIVERY

AUTHORIZED DISTRIBUTOR
TEXAS INSTRUMENTS
DATA TERMINALS

Westwood ASSOCIATES INC
DATA COMMUNICATIONS EQUIPMENT
25 Route 22 E / P.O. Box 10, Springfield, N.J. 07081

Corporate HQ. NJ (201) 376-4242
NYC (212) 662-0060 • Philadelphia (215) 972-0283 • S. Jersey (609) 829-7280
Conn. (203) 932-6383 • Pittsburgh (412) 881-2590 • Cleveland (216) 476-9336
Baltimore (301) 358-7812 • Miami (305) 944-1377 • Sarasota (813) 924-1058

Mainframe power.

Announcing the HP 3000 Series 44.

Our newest, most powerful computer supports everything in the photograph, including the new HP 2680 Laser Printing System. And you can take delivery on the computer in just 12-16 weeks.

Small system price.

The new HP 3000 Series 44 extends our computer family's performance range dramatically. For a system price starting at just $115,000.*

It has the power to handle 4 megabytes of memory, 1.9 billion characters of on-line disc storage, up to 96 terminals, 4 line printers, 7 synchronous datacomm lines and 8 mag tapes.

In five minutes, on-line users can access an IMAGE data base 1,560 times to enter or update orders. At the same time, the computer will respond to 51 inquiries into the data base, and generate formatted reports for all of them, with subtotals and totals. In the background, it can compile a 1200-line COBOL program 1.5 times. And read, sort and report a 9,000-record file twice. It will do all this while giving each on-line user a response in an average of 1.5 seconds!**

Six years of compatible software.

The Series 44 continues the HP 3000 tradition of compatibility. So it will run the software developed for earlier models. Or for smaller members of the current family.

And if you have a Series 30, 33 or III, you can get Series 44 performance and power by exchanging system processor units.

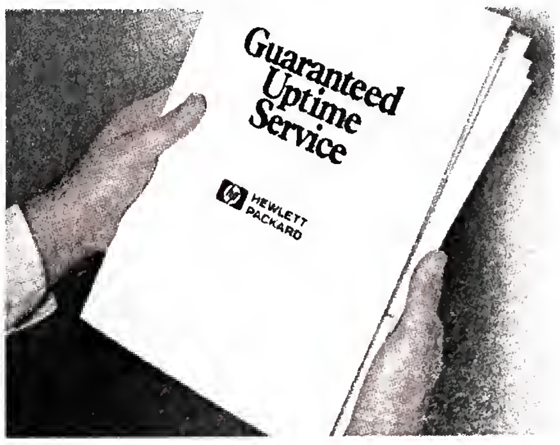
It also has all those other HP 3000 features—including IMAGE data base management and forms management—that make our computer family so easy to use and program. And we've given it an enhanced operating system, MPE IV, to manage the increased memory and discs even more efficiently than previous versions.

What's more, we made the Series 44 so reliable and supportable that you can get it with an extraordinary service guarantee.

Introducing Guaranteed Uptime Service.

This is a new maintenance agreement covering the processor and two discs. It guarantees up to 99% uptime over any three-month period or our service on these critical components is free for the next month.***

For more information about the powerful Series 44 and its remarkable service guarantee, call your local HP sales office. Or write Hewlett-Packard, Attn: Bob Bond, Dept. 391, 11000 Wolfe Road, Cupertino, CA 95014.



HEWLETT PACKARD

---

*U. S. domestic price includes 1Mb System Processor Unit, 50Mb disc, 1500bpi tape and CRT console.
**Series 44 and 4Mb memory, 3-120Mb disc drives, 1- 1600bpi tape drive, 1- 400LPM printer, 24 terminals (terminal activity simulated by HP TEPE program).
***Initially available in U.S. only.

47102HPG67

CDC Head Calls for Venture in Semi Research

(Continued from Page 71)

There are only two or possibly three efforts in microcircuits that can cope with the changing technological environment — Japan, Inc., IBM and possibly Bell Laboratories, Price maintained.

Making an analogy to the worldwide oil crisis, Price said the computer industry is currently treating semiconductor research as a "zero-sum game" — if you have the technology, you have it, and the other guy has got to buy or beg to get it.

But microelectronics research is not a zero-sum game; it is the application of the knowledge that counts, Price explained. With the semiconductor industry becoming more and more capital-intensive and the shortage of software talent for microelectronic applications becoming more acute, the industry still sees fit to "spend its resources like drunken sailors."

Cooperation and competition are not necessarily mutually exclusive. In Japan that spirit has produced rapid advancement in the computer industry as well as the steel, shipbuilding and automotive industries, Price said.

While industry cooperation is not common in the U.S., it must be tried, Price urged. He pointed to positive experiences of Computer Peripherals, Inc. (CPI) and Magnetic Peripherals, Inc., joint ventures in which CDC is involved with Honeywell, Inc. and NCR Corp. However, he did note it took five years for CPI to get off the ground and that the initial venture required about one year's negotiation with the Justice Department and other government agencies.

tures as coming under the command of one company, but this is not necessarily the case, Price said. The marketplace can dictate what research a joint venture conducts.

Price laid out a blueprint for the formation of what he called Microelectronic Enterprises, Inc., the company he proposed to develop state-of-the-art circuit technology. Such a venture would require an investment of $100 million for R&D annually and about the same amount for capital expenditures if production facilities were established.

To survive, according to Price, such a venture must:

- Be limited to R&D and production and not include marketing.
- Be broad-based, including many participants.
- Have a clear value-added strategy to provide market distinctiveness for the circuits.
- Be focused on advanced technology — that which is five to 10 years ahead of today's products.

Office Systems A Top Challenge

(Continued from Page 71)

by developing a master plan for integrating the offices into the organization's information management. One way of accomplishing this transition is by establishing a pilot program within the organization which demonstrates the applicability of office automation to the firm, O'Kelley suggested.

Noting that the overall automation of the office will be a slow process, he said Datapoint usually determines where users are likely to innovate first, then assists them in starting a pilot project. From this first step the process will spread naturally over time.

Integrating the office function into the organization's data management function depends ultimately on the development of a high-speed interprocessing bus. "This will become a reality when IBM decides to do it," O'Kelley quipped.

Mergers & Acquisitions

Automatic Data Processing, Inc. has acquired **Telephone Computing Service, Inc.** of Seattle.

Alpha Industries, Inc. has agreed in principle to acquire **Transtech, Inc.** of Gaithersburg, Md., and **Central Microwave Co.** of St. Charles, Mo.

Amcor Computer Corp., Louisville, Ky., a developer and supplier of computer software, has been acquired by Houston-based **Kaneb Services, Inc.**

Azurdata, Inc., the Redmond, Wash.-based manufacturer of portable data entry and processing equipment, has acquired **Sensor Based Systems** of Flagstaff, Ariz.

Informatics, Inc. and **Professional Software Systems, Inc.** have signed a letter of intent for Informatics to acquire the business of Professional Software Systems.

INPUT CENTER
DATA ENTRY SERVICES

- LOW, LOW PRICES
- LARGE VOLUMES
- FAST TURN-AROUND
- ESTIMATES BY PHONE

CALL COLLECT
312-943-1551
200 N. Michigan, Chicago, IL 60601

We were here three years ago.

With Heavy R&D Expenditures

'Fight Fire With Fire' Urged to Counter Japan

By John Whitmarsh
CW Staff

NEW YORK — How should the U.S. meet the challenge of the Japanese in high technology?

"The answer is to fight fire with fire," according to Harry J. Gray, chairman, president and chief executive officer of United Technologies Corp.

"We must persist in making the heavy capital and R&D expenditures necessary to stop inroads into our markets by the Japanese and any other countries," Gray said in his keynote address at Electro '81, the three-day meeting of the electronics industry held here recently.

Because the U.S. may be its own worst enemy in the battle for technological supremacy, Gray outlined a four-point plan to keep the U.S. in the forefront of the race with the Japanese.

First, American business must be encouraged — and prepared — to make major investments in R&D in hard times as well as prosperity.

Roughly two-thirds of all advances in managerial and technical knowledge stem from formal R&D programs, Gray said, adding that half our country's increases in productivity over the past 50 years have resulted from technological advances made possible by R&D.

United Technologies, he said, would plow "over $700 million" into R&D this year vs. $645 million last year. That amounts to 5.8% of sales for the $12 billion conglomerate, whose divisions include Mostek Corp. semiconductors, Pratt & Whitney Aircraft jet engines, Carrier air conditioners, Otis elevators and Sikorsky helicopters.

Second, Gray said, "capital investment is of ultimate importance . . . since it is the vehicle that carries discovery into the marketplace."

The rates of capital formation have been falling in the U.S., he said, but there are two immediate remedies.

"In the short term, American industry needs the accelerated depreciation allowances proposed by the Reagan administration to recoup investment costs more quickly."

Second, the taxpayer should be allowed to choose the year in which to take the deduction, Gray said.

"Depreciation allowances, obviously, are of no value unless they can be applied against taxable income. Our large auto companies and many semiconductor manufacturers are making heavy capital investments in a period of very soft demand. Such a measure would benefit these companies as well as the small, start-up entrepreneurships that have been so important to our industry," Gray said.

Japan is outpacing the U.S. in capital formation. As a result it has made significant advances in new technology. "Japan's ratio of capital formation to Gross National Product (GNP) in 1979 was nearly double that of the U.S.," Gray said.

He added that the Japanese have half the world's sophisticated robots turning out high-quality cars, inexpensive electronics equipment and all kinds of industrial equipment — even other robots.

"What's more," Gray injected, "the average Japanese worker and his union readily accept these changes."

The Japanese have already captured 40% of the random-access memory (RAM) market, Gray said, adding that Japanese semiconductor sales rose from $62 million in 1977 to $370 million last year.

Government Disincentives

Third, Gray called for an aggressive American export policy. He warned that trade barriers and protectionist policies merely harbor inefficiencies and shoddy workmanship in the short term, while laying the foundation for heavy doses of inflation and economic retaliation by other nations over the long haul.

The U.S. has been much less aggressive in its export policy than have Japan and Europe because, Gray said, the U.S. is "hindered by many disincentives strewn across our path by our government."

Those disincentives include poor tax treatment of Americans working abroad, inordinate export controls, certain provisions of the Foreign Corrupt Practices Act, restraints on the formation of U.S. trading companies, antitrust constraints and inadequate Export-Import Bank lending authority.

"The federal government estimates that a billion dollars exported translates into 40,000 jobs here at home, $2 billion in GNP and $400 million in federal tax revenues. That's one reason the Japanese put such heavy emphasis on exports," Gray said.

Fourth, American business "must insist that the government do its part." The federal government can help not only by encouraging capital formation and exports, Gray said, but also by "coming to grips with its own productivity and beginning to put its own house in order" — specifically by bringing wasteful spending under control and by examining the cost of "excessive regulation."

Now we're here.

Datapoint is way past the drawing stage.

With over 1500 local networks installed, Datapoint integrated business information systems are already doing office-of-the-future jobs in the office of today.

Datapoint's Integrated Electronic Office™ offers data processing, word processing, electronic message service, and management of voice and data communications, all in one. All the basic business functions can be truly integrated at multifunction workstations to help your people become more productive.

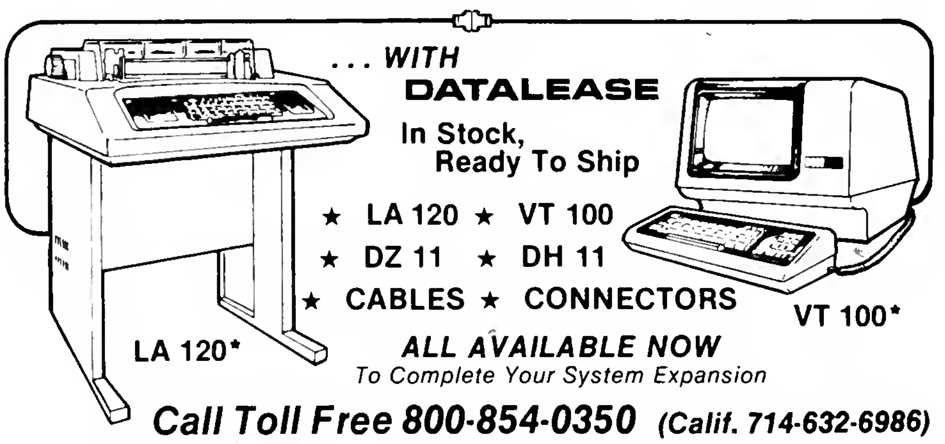
The Integrated Electronic Office is based on our ARC™ local network. Datapoint introduced the concept of local networking more than three years ago. Now, more business is processed on ARC coaxial networks than all others combined.

In an ARC network, workstations, processors, printers, and files can be linked together so that all resources are available to all users. But ARC goes well beyond conventional cable networks. No matter where a file is physically located, the information on it — both words and data — may be accessed as a common compatible information base. And this information may be organized to match a company's structure, with security controls at all levels.

Start where you choose. Grow with your needs. With ARC you can add processing power, workstations, storage, and peripherals without constant reprogramming. And no matter how large your Integrated Electronic Office grows, you'll get responsive performance at every workstation.

We're ready to help you get your office of the future off the drawing boards and into operation. For more information, send for our new brochure, "The Integrated Electronic Office." Write: Datapoint Corporation, Corporate Communications T-41CW, 9725 Datapoint Drive, San Antonio, TX 78284. Or call (512) 699-7059.

DATAPOINT



MAKE THE RIGHT CONNECTION...

... WITH
DATALEASE
In Stock,
Ready To Ship

★ LA 120 ★ VT 100
★ DZ 11 ★ DH 11
★ CABLES ★ CONNECTORS
ALL AVAILABLE NOW
To Complete Your System Expansion

Call Toll Free 800-854-0350 (Calif. 714-632-6986)

DATALEASE R The DEC Specialists©

*Registered Trademarks of Digital Equipment Corporation

2770 EAST REGAL PARK DRIVE, ANAHEIM, CA 92806 • TELEX: 692439

Japanese 'Invasion' Issue Seen in Need of Perspective

By Bob Johnson
CW New York Bureau

NEW YORK — "The whole issue of a Japanese technological invasion is too emotional and must be looked at in the proper perspective," according to Dr. Mirek J. Stevenson, chairman of Quantum Science Corp. Stevenson made his remarks in an address given at the American Institute of Professional Education's recent seminar here on "The Japanese Invasion of the U.S. Computer Industry."

Drawing on 16 years' experience in analyzing Japanese companies, Stevenson said a different view of the computer market must be taken in the next few years in relation to Japanese companies. "There is a rapid shift to departmental processing for offices, combined with the continued emergence of IBM plug-compatible equipment. These are areas where the Japanese companies, such as Fujitsu, Ltd. and Hitachi [Ltd.], have been predominant," he said.

According to Stevenson, the Japanese have a big advantage in the area of intelligent copiers. The development of Kanji characters, for example, put the Japanese in a leading position in graphics materials.

Teleconferencing, local networks, electronic mail and fiber optics, which are all communications-oriented, give the Japanese an additional advantage over U.S. companies, which are not as communications (PABX)-oriented. This will hurt U.S. companies, according to Stevenson, who predicted that within five years 90% of American business will be involved in this type of departmental processing.

The areas of departmental systems where Stevenson said the Japanese have a head start are departmental controllers (IBM plug-compatible minis); high-quality, nonimpact printers; workstations with graphics capabilities; and interoffice and external communications interfaces.

"In every element of these future systems, the Japanese do more research and development, planning and product improvement," he said.

The Japanese will enter the market gradually, he said. These systems will eventually become the core of modern business offices, and the Japanese have targeted the corporate industry in the U.S. because of a slowdown in the Japanese domestic market.

Stevenson added that many Japanese companies have entered joint ventures with American companies in order to gain specific knowledge of U.S. systems software and marketing techniques.

The thrust of Japanese companies into the U.S. market will also come from the personal computing segment of the market through retail channels such as J.C. Penney and Sears, Roebuck and Co., he said.

"The essential elements of Japanese marketing are product quality, prompt and reliable delivery and frequent sales coverage," Stevenson added, pointing out that such is not the case with U.S. companies.

He added that the Japanese commitment to R&D is headed in the proper direction for market penetration in this country: Fujitsu spent $144 million, or 6.1% of its revenues, on R&D. In addition, the number of R&D personnel in Japan has risen 72% in the 10-year period from 1968 to 1978, compared with only a 4% rate of increase in the U.S.

Two companies to watch, according to Stevenson, are Fujitsu and Hitachi. Fujitsu had a 1980 growth rate of 8% with revenues up to $1.3 billion, which represents 65.2% of its total sales; it has surpassed IBM as Japan's leading computer vendor.

Hitachi computer sales reached $982 million, making it the third-largest computer vendor in Japan.

"By the end of the decade, management will wonder how it ever got along without graphics"

Once limited to specialized scientific and engineering applications, computer graphics have now stormed into the office, whetting the appetites of productivity-concerned decision makers by dramatically delivering instant analysis. . .with a few simple English commands!

And, with a staggering compounded growth rate of 35% per year through 1984, there's no doubt computer graphics have entered the office to stay.

Are graphics for you?

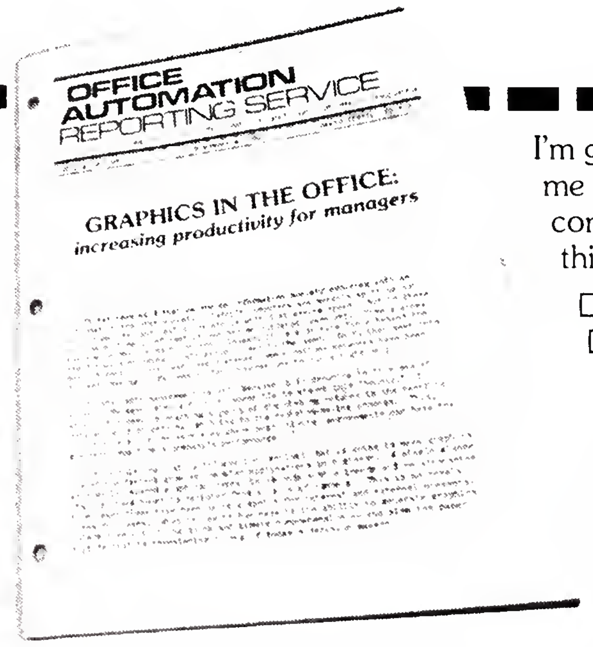
Are you concerned about spending hours studying tables of numbers to decipher trends and relationships that graphics can reveal in seconds? Are you frustrated having to depend on the whim of your graphic arts department? Are you beginning to wonder what computer graphics can really do?

To bring this subject into focus, International Data Corporation, the leading information processing research firm, presents an in-depth Special Report, ***Graphics in the Office: increasing productivity for managers.*** It contains: everything you should know about graphics. . . *before you jump in!*

Facts! Figures! Forecasts!

In easy-to-understand terms, this Special Report gives you an overview and ***market perspective***. You'll learn about ***types of equipment***—advantages and disadvantages. ***Output and input devices***—strengths and weaknesses. It tells you ***applications***, including the role of graphics in a decision support system, ***case histories***—how are companies using graphics right now? (And there are plenty out there!) It even tells you ***how to implement a system in your office***. . . step by step!

Are computer graphics for you? Maybe yes, maybe no. Maybe now, maybe later. *But maybe it's time you find out!* Don't miss this $245, 32-page single spaced report, ***Graphics in the Office: increasing productivity for managers***. . . the who, what, when, where and how of graphics today. . .and tomorrow!


OFFICE AUTOMATION REPORTING SERVICE
GRAPHICS IN THE OFFICE:
increasing productivity for managers

I'm glad at last somebody can tell me what I need to know about computer graphics! Please rush this Special Report to me today!

☐ Bill me.
☐ Check/PO for $245 is enclosed.

Name ______
Title ______
Company ______
Address ______
City ______ State ______ Zip ______

Mail To:
International Data Corporation
Attn. Mary Trayte
5 Speen Street
Framingham, MA 01701

To Meet Japanese Challenge

Congressional Assists Predicted for Trade, Tax

By Bob Johnson
CW New York Bureau

NEW YORK — The computer industry definitely will get some trade and tax assistance from the 97th Congress, according to Rep. James M. Shannon (D-Mass.).

In a recent address at an American Institute for Professional Education seminar here on "The Japanese Invasion of the U.S. Computer Industry," Shannon said that the U.S. faces no greater economic challenge than that of responding to Japanese technological competition.

"Japan's high-technology challenge is clear and immediate," Shannon said. "If the Japanese become world leaders in high-technology products, they will be driving *us*. To paraphrase the Nissen ad, '*We* will be driven.'"

Shannon called for an all-encompassing U.S. industrial policy devised not by bureaucrats, but by a coalition of industry, labor and government with a national vision.

"I believe that the key to our renewed productivity growth and renewed trade competitiveness lies in the development of new products and industrial processes," Shannon said "We must have a national commitment to research and development. The Japanese government actively supports R&D; the U.S. government does not, and it's beginning to show."

Japanese businesses are allowed a 20% tax credit for R&D, Shannon noted, adding that he has proposed legislation to support industrial research in a way that would complement the Reagan administration's recent tax proposal.

Establishing tax credits for increased industrial R&D, offering incentives for business support of university research and training, allowing businesses to offer incentive stock options to employees and encouraging firms to locate their R&D operations in this country rather than abroad are among government's contributions to the overall effort, Shannon said.

What would such an effort cost? The entire program could be enacted in fiscal year 1982 for a revenue loss of $728 million, Shannon estimated.

In the area of tariffs, Shannon said that the House Subcommittee on Trade has been working on a request to harmonize semiconductor tariffs with Japan. "Tariff harmonization will ensure that competition between the two countries is free and open and that the Japanese are not able to impose an extra 5% of tariff protection over the next several, crucial years," he said.

'Japan, Inc.': Fact or Fiction?

(Continued from Page 71)

employees are even singing company songs as IBM's did at that time."

The real goal of Japanese companies is to produce and distribute mainframes carrying Japanese names and using Japanese software, Mertz said. They appear to be succeeding. Amdahl Corp. in 1975 spent $17 million on equipment from Fujitsu; three years later, the figure was $92 million. He estimated that the Japanese would ship $300 million worth of computer equipment to the U.S. this year.

Japanese businesses are not the only ones subsidized by their government, according to Dr. Mirek J. Stevenson, chairman of Quantum Science Corp. U.S. companies are at times also subsidized by the U.S. Department of Defense, he said.

But government funding is only half of the problem, the speakers agreed. The other half is that American business, unlike Japanese, does not foster team spirit and trust in its workers. The Japanese offer far more incentives and benefits to their employees, who in turn feel a strong sense of lifetime commitment. This feeling of security and of belonging is a major part of the Japanese worker's attitude and accounts for his dedication and attention to quality. The net result is higher quality products, often at lower cost.

Glen R. Madland, chairman of Integrated Circuit Engineering Corp., agreed that the work ethic in this country must be changed if the Japanese thrust is to be countered.

Expressing a technological separatist view, Edward Lesnick, assistant to the president of Wang Laboratories, Inc., stressed that specific actions must be taken to reduce the flow of technological information to other countries. Lesnick cited instances where Japan's Ministry of International Trade and Industry canceled technology transfer agreements after the information they wanted to see was in their hands. "If the Japanese want access to the U.S. market in reciprocal trade, then we must insist on the same privileges," he said.

Wang no longer allows visitors to tour its facilities for non-sales-related reasons, Lesnick said, and he urged all American companies to keep their information to themselves.

AT LAST, A DATA TERMINAL COMPANY THAT ISN'T LOYAL TO ANYONE.

Call a manufacturer and you'll hear one story: Me, me, me.

Call Selecterm and you'll hear the whole story: Which manufacturer is best for what kind of business; where the new technology is coming from; which terminal and how many.

Selecterm leases the finest data terminal equipment from all the major manufacturers of terminals. We don't just push one (unless we think he happens to be the best one for you).

We won't recommend more terminals than we think you need.

We won't hold anything back: If there's better equipment coming out in a month or two, we'll tell you to wait.

You see, we're in business to offer you management help on the selection and service of the best terminal equipment.

The best doesn't mean the one that's most easily available, or the one that brings in the highest commission.

The best means the one that's best for you.

Because what's best for you is best for us.

To our way of thinking, an open mind is a lot better than blind loyalty.

SELECTERM®

We won't let you go wrong. 2 Audubon Road, Wakefield, Massachusetts 01880. Offices in Boston, (617) 246-1300; New York, (212) 868-1300; Washington, D.C., (703) 522-2520; San Francisco, (415) 461-5730 and Chicago, (312) 595-3994.

While Braegen Increases Funding

MAI to Acquire Braegen Assets

CUPERTINO, Calif. — Management Assistance, Inc. (MAI) of New York will acquire certain assets of the Braegen Corp. April 30 if the agreement is approved by the two companies' boards of directors.

Separately, the Braegen Corp. announced an increase in funding and the acceptance of its three-year operations plan by its investor group. The funding increase is approximately $7.5 million, plus an increase in the firm's bank credit line.

In addition, divisional status has been granted to Braegen's three major areas of business: Terminal Systems, Mini-Peripheral and Automated Tape Library. The purpose is "to reinforce direct and experienced management attention to operational and fiscal controls," a company spokesman said.

As a part of the approved increase in working capital, emphasis will be placed on additional research and development in the Terminal Systems Division and revenue growth for the other divisions.

Sorbus Maintenance

Under the MAI/Braegen agreement, the assets acquired by MAI would permit its Sorbus Service Division to provide maintenance service for disk and tape systems originally manufactured by California Computer Products, Inc. that are compatible with computers manufactured by IBM and other companies.

Sorbus would supply maintenance service for these products presently serviced by Braegen.

Sorbus plans to offer employment to all Braegen service representatives and a majority of the administrative and management personnel involved with these products.

Braegen management has indicated it will continue to provide maintenance service for its remaining product lines.

The acquisition is expected to increase Sorbus' annual revenues by approximately $10 million.

IBM SYS/34...SYS/38
Are You
CONVERTING to S/34 or S/38?
DEXEL can be your one stop for all your computer needs!
We specialize in:
SOFTWARE
• DEVELOPMENT
• INSTALLATION
• PROGRAMMING
FINANCING
• HARDWARE
• SOFTWARE
• TAX LEASES
dexel
1250 Broadway at 32nd Street
New York, New York 10001
(212) 279-1717 Tlx: 64-9356

WHITESMITHS SUPPORTS VAX!
WHITESMITHS SUPPORTS 68000!
WHITESMITHS SUPPORTS PDP11!
WHITESMITHS SUPPORTS 8080/Z80!
EXAMPLE No.1:
Whitesmiths C...the only C Compiler that runs on all of them!
Protect your software investment.
Whitesmiths, Ltd.
P.O. Box 1132 Ansonia Station
New York, N.Y. 10023
(212) 799-1200
Write or call for information.

Expansions

Deltak, Inc. has announced that it will be moving its home office from Oak Brook, Ill., to a new, four-story office building under construction in Naperville at the intersection of Illinois Rt. 59 and the East-West Tollway. Deltak is anticipating more than doubling its headquarters personnel.

Nestar Systems, Inc. has announced the expansion of its operations into new quarters, which are located at 2585 E. Bayshore Road, Palo Alto, Calif.

COMBINE ICR Index™
and DATAPOINT
for
A MAJOR BREAKTHROUGH IN DATA ENTRY TECHNOLOGY

CALL TOLL FREE 1-800-247-5224
ICR, 666 Grand Ave., P.O. Box 657, Des Moines, Iowa 50303
In Iowa call 1-515-281-2717

Nippon Merges U.S. Arms, Forms NEC Electronics

SUNNYVALE, Calif. — Nippon Electric Co., Ltd. (NEC) of Tokyo has announced the merger of its three subsidiary companies in the U.S. and the establishment of NEC Electronics USA, Inc., to be headquartered here.

The new firm was established to coincide with the expanding scale of NEC's business in the U.S. electronic devices market, NEC said. It has been manufacturing and marketing in the U.S. through its wholly-owned subsidiary companies — Electronic Arrays, Inc. in Mountain View, Calif., NEC Microcomputers, Inc. in Wellesley, Mass., and NEC Electron, Inc. here.

Electronic Arrays has been manufacturing and marketing 16K-bit random-access memory systems and read-only memory systems. NEC Microcomputers has been marketing LSI memories and microprocessors, and NEC Electron has been manufacturing discrete semiconductor devices, linear integrated circuits, display devices and capacitors.

NEC Electronics USA, Inc. has three divisions managed by the former presidents of the merged subsidiaries, who will now assume the title of executive vice-president of the corporation and general manager of their divisions.

ADR, Nixdorf Companies Settle Marketing Dispute

BURLINGTON, Mass. — Applied Data Research, Inc. (ADR), Nixdorf Computer AG, Nixdorf Computer Corp. and Nixdorf Computer Software Co. (NCSC) have announced an agreement concerning litigation between them pending in federal courts in Virginia and New Jersey.

According to a release issued by the companies, "The settlement agreement permits the Nixdorf companies, under conditions which were not disclosed, to continue marketing the data base management software products with respect to which the previous disputes had arisen."

ADR had originally asked the U.S. District Court in Richmond, Va., to promulgate a declaratory judgment, which would have prevented NCSC from licensing and leasing ADR's Datacom data base management software [CW, April 18, 1980].

Supershorts

Kierulff, a division of Ducommun, Inc., and Memorex Corp. have signed an agreement appointing Kierulff the first national electronic distributor for Memorex' computer media line. Under the terms of the agreement, Memorex tapes, flexible disk media, disk packs and cartridges will now be distributed from Kierulff Distribution Centers.

— — —

Communications Satellite Corp. has leased its 10,000th international satellite communications circuit.

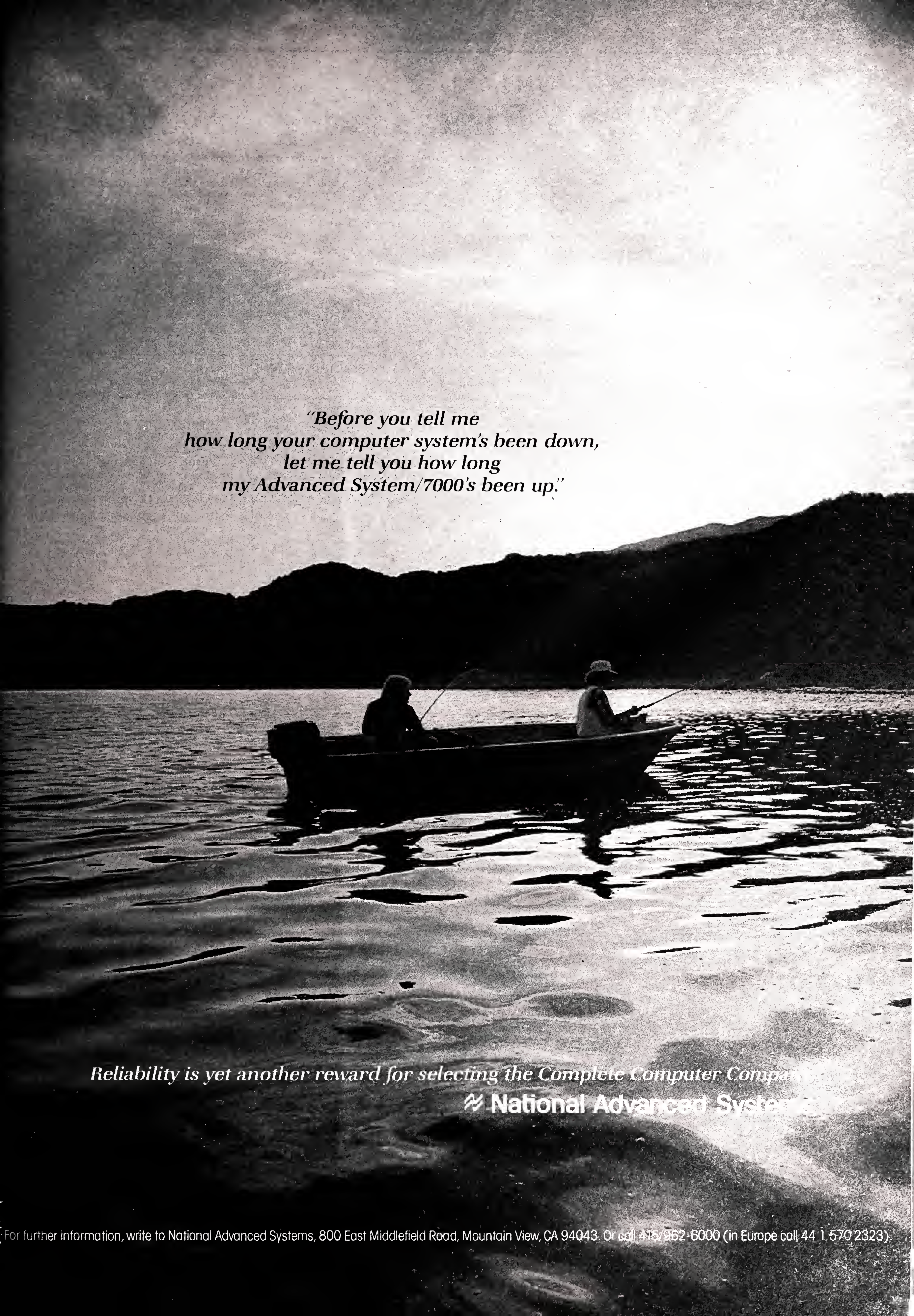
— — —

Omnidata has announced the formation of Omnidata Research Corp., a wholly owned research subsidiary in Palm Desert, Calif.

You can't RENT the right peripheral if you don't have a choice.

for example:		1 year (inc. maint.)
DEC	LA 34	$ 63/mo.
DEC	LA 120	135/mo.
DEC	VT 100	93/mo.
TI	745	89/mo.
TI	785	120/mo.
Racal Vadic	3434	53/mo.
Racal Vadic	3451	52/mo.
Lear Siegler	ADM 3A	50/mo.
Teletype	43KSR	70/mo.
Diablo	1640	160/mo.
Qume	5/45 KSR	175/mo.
TeleVideo	920C	58/mo.
ADDS	Viewpoint	46/mo.
Execuport	4000	138/mo.

And many others
We've got it!
We've got it! The largest choice of computer terminals, printers, disc storage devices, and telecommunications equipment available.
We've got it! An organization that's in the business of providing exactly the right product for your application.
We've got it! Many other rent, lease, time, or terms available. Corporate and quantity discounts, too.
DJC
THE DAVID JAMISON CARLYLE CORPORATION
Two Century Plaza,
30th Floor/2049 Century Park East
Los Angeles, California 90067
New York (201) 946-9669
San Francisco (415) 835-9820
Los Angeles (213) 277-4562
Honolulu (808) 531-5136
Chicago (312) 975-1500
Orange Co. (714) 640-0355
Choice is our business.


"Before you tell me
how long your computer system's been down,
let me tell you how long
my Advanced System/7000's been up."
Reliability is yet another reward for selecting the Complete Computer Company.
National Advanced Systems

For further information, write to National Advanced Systems, 800 East Middlefield Road, Mountain View, CA 94043. Or call 415/962-6000 (in Europe call 44 1 570 2323).

'We Are a Networking Company'

Tymshare Not Just Time-Sharing Any More

By **Rita Shoor**
CW Staff

CUPERTINO, Calif. — What's in a name? Not as much as there used to be for Tymshare, Inc., based on a recent interview here with Laszlo L. Rakoczi, group vice-president.

Notwithstanding the company name, time-sharing is no longer the key to Tymshare. "We are a networking company" and that means delivering "highly enhanced communications linkages" between terminals and computers, Rakoczi explained. "That's what we do well."

Attributing the success of Tymnet, Inc., a wholly owned subsidiary of Tymshare, to the intelligent network's ability to allow almost any terminal to be used by a computer without software modification, Rakoczi maintained that the company has taken this matching concept even further.

Besides matching up hardware components, the packet service actually ties the end user to the data base he requires. Describing this communications area as a "specialty market," he claimed that this type of service is Tymshare's "birthright."

With delivery systems in some 30 countries and a reported 65% annual growth rate, the firm is obviously concentrating on its birthright.

This emphasis is hinted at by the firm's tendency in the last few years to take a close look at how any potential acquisition can fit into the intelligent network set-up before opting to purchase it, he said.

He cited Tymshare's 1977 acquisition of the Western States Bankcard Association (Wesba) as a typical case. Wesba was operating across 13 states, but "was losing money every year" and operating like a "country club," he recalled. However, when Tymshare along with several other companies was approached about buying the association, it made a successful bid because Wesba's future seemed to fit into the intelligent network environment, he said.

Rakoczi predicted that "composite applications" would be the next step for intelligent networks to increase service to the enduser. Essentially, this means that several different operations are performed upon a single transaction after it has entered the network, he explained.

One example of this would begin with a travel agent who entered a reservation transaction into Tymnet in order to get a seat on a specified airline. The same transaction could also be captured in order to provide accounting and billing services to the travel agent, Rakoczi continued. Acknowledging that providing the additional application would probably mean some redesign of the original reservation transaction, he still foresaw a favorable reception from network endusers for the composite application concept.

Again emphasizing Tymshare's commitment to the communications area, Rakoczi pointed out that time-sharing could actually be viewed as just another application to the intelligent network.

Warren Prince, vice-president, agreed with this, noting that there had been a 50% growth each year in electronic data communications over recent years — a trend that had received impetus from high Wats-line charges.

Future company growth would therefore include adding applications such as electronic mail. "It almost competes with the post office right now," he claimed. Tymshare's Tyme-gram service, formally announced last year [CW, May 26], which is targeted toward companies that want the same letter to go to thousands of people overnight, is typical of such value-added applications, he said.

Contracts

Sperry Univac has been awarded a $19.2 million systems life value contract for 73 System 80 computers and related software and peripherals by the U.S. Army Systems Selection and Acquisition Agency.

Genisco Computer Corp. has received contracts valued at more than $1.25 million for its G-1000 graphics terminal. The company has been awarded a contract by Graphics Technology Corp. valued at approximately $1 million and an order from Drafting Dynamics valued at $250,000.

Paradyne Corp. has been awarded a contract by the Social Security Administration to supply replacement terminal systems for the Social Security Administration/Data Acquisition and Response System network.

Computer Sciences Corp. has been awarded a contract by the Environmental Protection Agency for continued systems operations and maintenance services at 19 EPA sites. The company values the award at $8 million over a 32-month period.

This advertisement is neither an offer to sell nor a solicitation of an offer to buy any of these securities.
The offering is made only by the Prospectus.

April 9, 1981

1,500,000 Shares

MSA

Common Stock

Price $16 Per Share

Copies of the Prospectus may be obtained from such of the Underwriters as may legally offer these securities in compliance with the securities laws of the respective states.

Alex. Brown & Sons
The Robinson-Humphrey Company, Inc.

Bache Halsey Stuart Shields
Incorporated
The First Boston Corporation
Bear, Stearns & Co.

Blyth Eastman Paine Webber
Incorporated
Dillon, Read & Co. Inc.
Donaldson, Lufkin & Jenrette
Securities Corporation

Drexel Burnham Lambert
Incorporated
Goldman, Sachs & Co.
E. F. Hutton & Company Inc.

Kidder, Peabody & Co.
Incorporated
Lazard Frères & Co.
Lehman Brothers Kuhn Loeb
Incorporated

Merrill Lynch White Weld Capital Markets Group
Merrill Lynch, Pierce, Fenner & Smith Incorporated
L. F. Rothschild, Unterberg, Towbin

Salomon Brothers
Shearson Loeb Rhoades Inc.
Smith Barney, Harris Upham & Co.
Incorporated

Warburg Paribas Becker
A. G. Becker
Wertheim & Co., Inc.

Dean Witter Reynolds Inc.
Hambrecht & Quist

Codex President Expects Rapid Growth In Voiceband Communications Market

By Brad Schultz
CW Staff

LAS VEGAS — The market for 14.4K bit/sec voiceband data communications is small now, but will grow rapidly, according to the president of Codex Corp., which recently introduced a 14.4K bit/sec voiceband modem [CW, April 6].

Interviewed at a recent conference here, Art Carr noted that users were "scared" by the idea of data passing at 9,600 bit/sec through conventional telephone lines when vendors started offering equipment to do it. Codex introduced the first commercial 9,600 bit/sec modem in 1967, but Largo, Fla.-based Paradyne Corp. unveiled the first commercial 14.4K bit/sec set, the MP 14.4, a few months ago.

The new Codex SP 14.4 modem appears to be the Paradyne MP 14.4's only competition at present. In terms of unit price, the SP 14.4 costs about 30% less than the Paradyne product, which reportedly goes for $14,400.

High-Speed Growth

Today, the market for 9,600 bit/sec data communications gear is growing faster than the 4,800 bit/sec market, Carr told *Computerworld*. Popular data rates in the "high-speed" voiceband range include 2,400-, 4,800- and 9,600 bit/sec, although 2,400 bit/sec is often considered "medium speed." (Datapro Research Corp. has defined high-speed voiceband communications as beginning at 3,600 bit/sec.)

Codex and Paradyne are thus angling for the lead in sales of the fastest high speed modems, but Carr said he expects other vendors to enter the contest eventually. Just as with the advent of 9,600 bit/sec products, users will initially be reluctant to buy 14.4K bit/sec equipment.

Users know that data integrity and hardware reliability is more difficult to maximize at the fastest voiceband rates, Carr explained. On the other hand, users want faster rates to move data more cost-effectively.

They also want ability to exercise more control over network performance from central headquarters, the Codex president continued. The Motorola, Inc. subsidiary hopes to bank on that with its newly extended family of Distributed Network Control Systems (DNCS).

Interface '81 was where Codex introduced the $85,000 DNCS 400, based on a 512K-byte Data General Corp. minicomputer. Carr said DG will continue supplying processors for DNCS systems.

Many first-time data communications users want extensive network management capabilities from the outset, he pointed out. Like other independent vendors of data communications products, Codex concentrates on providing gear that off-loads management chores from host systems, freeing the hosts for more computational burdens.

Three-Pronged Strategy

Last fall, Carr described a three-pronged Codex marketing strategy that goes by the name "integrated communications [CW, Oct. 20]." He then told the press that Codex products will tackle problems of *exchange*, getting information into the network; *transport*, getting information through the network to its destination; and *command*, controlling the network from a central site.

'Doomsday Talk'

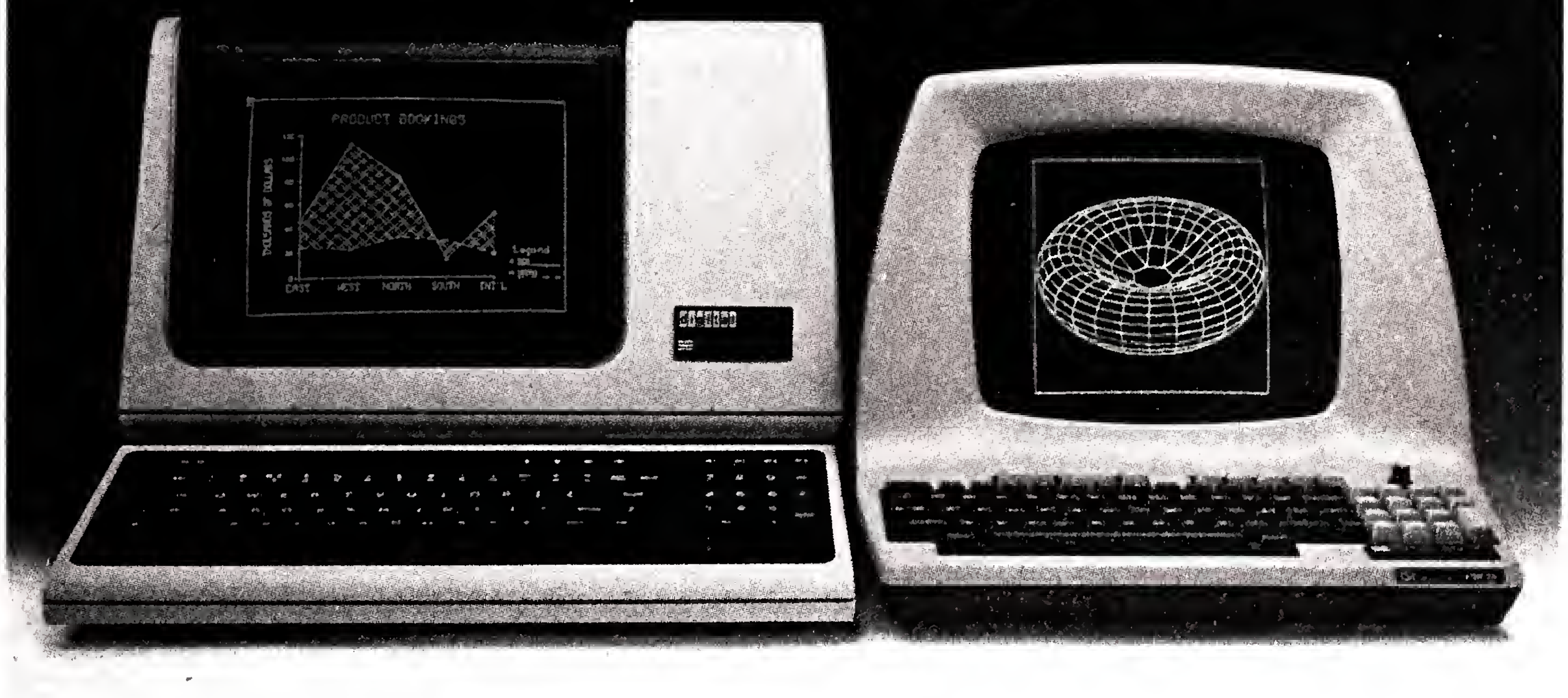
Asked to comment on some currently hot issues in data communications, Carr maintained that private data networks will continue serving as a major interface between end users and the public data networks, despite what he called "doomsday talk" that users will be pressured into nearly exclusive dependence on public nets.

Some pundits have warned that a deregulated AT&T, allowed to sharply increase private-line lease rates, may make American users more dependent on its switched facilities. And in Europe, the national postal, telephone and telegraph (PTT) monopolies have — in actions that affect U.S.-based international businesses — pushed for bans on private line usage, usually on pretexts that private lines pose privacy risks or economic disadvantages.

But in the UK, Prime Minister Margaret Thatcher's administration has reversed this trend, Carr noted, adding that in the U.S., private lines will always be a more attractive alternative in "reaching West Podunk" — isolated hamlets with little market value for the public net operations of common carriers.

Art Carr of Codex

The Idea Is Retro-Graphics.™



Retro-Graphics is quite literally changing the face of the display terminal marketplace. Because the line of graphic enhancement products that carries the Retro-Graphics name transforms some of today's most popular alphanumerics terminals—the DEC™ VT100™ terminal, for instance, and Lear Siegler's ADM-3A and 3A+ Dumb Terminal® products—into terminals that feature *full graphics capabilities.*

These enhanced terminals feature complete emulation of their Tektronix® counterparts, the 4010 Series graphics terminals. Additionally, they boast vector drawing and point plotting capabilities, selective erase, alphanumerics overlay, raster scan technology and, of course, complete compatibility with industry standard software, including Tektronix Plot 10™ and ISSCO's® DISSPLA® and TELLAGRAF.® And Retro-Graphics delivers all of this while retaining the original alphanumerics features of the enhanced terminals.

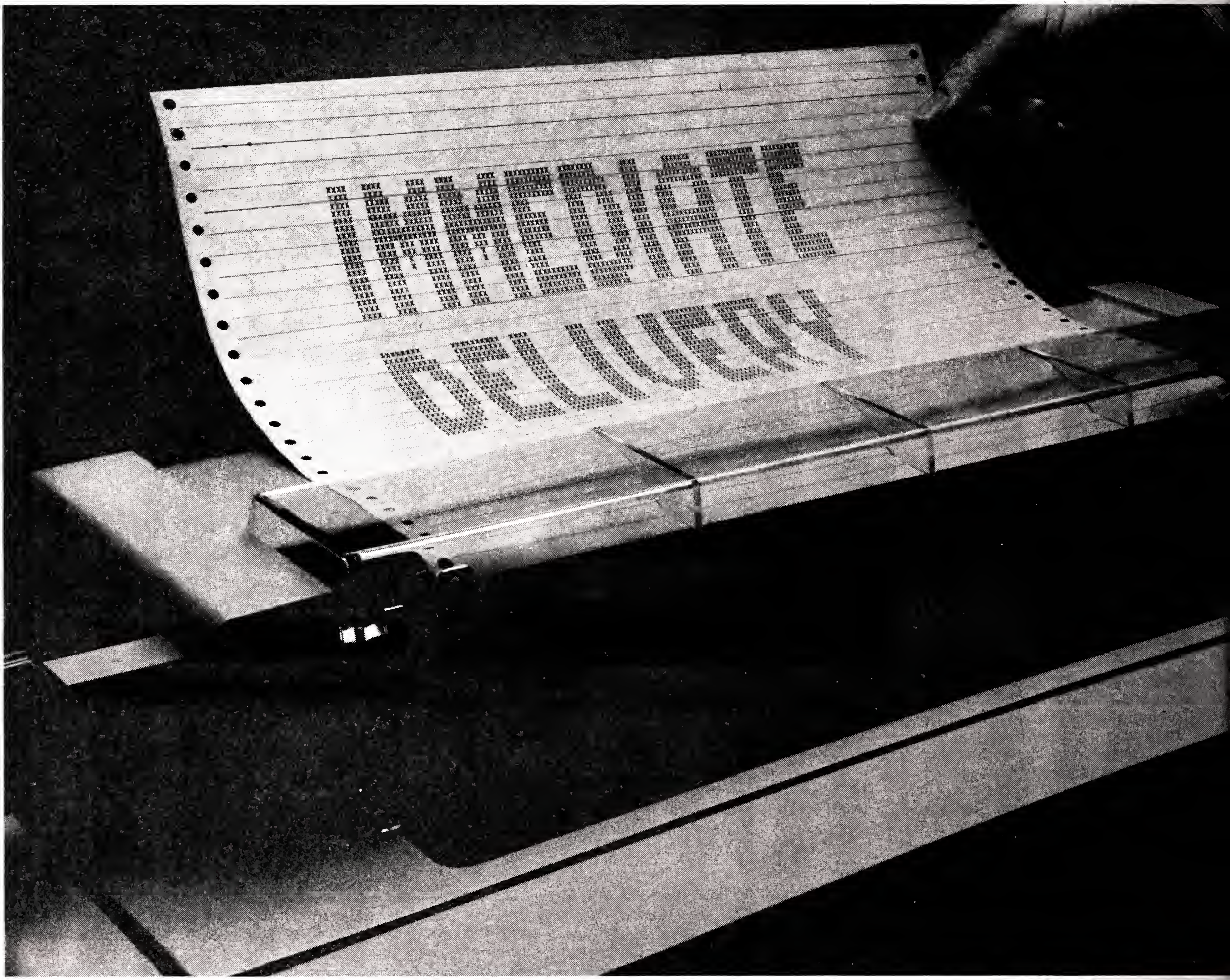
Thousands of users who have put Retro-Graphics enhancements into action can attest not only to the performance benefits but, importantly, to the often dramatic cost savings over comparable terminals. Savings that have amounted to upwards of 50% and more. Together, high quality and low cost make Retro-Graphics one of the brightest ideas to come along in some time. The idea you can check out for yourself by calling your Digital Engineering distributor. Or contact us direct.

DIGITAL ENGINEERING
630 Bercut Drive, Sacramento, CA 95814
(916) 447-7600 TWX 910-367-2009

Retro-Graphics ™ is a trademark of Digital Engineering, Inc. Dumb Terminal® is a registered trademark of Lear Siegler, Inc. Tektronix® and Plot 10® are trademarks of Tektronix, Inc. ISSCO,® DISSPLA® and TELLAGRAF® are registered trademarks of Integrated Software Systems Corporation. DEC ™ and VT100 ™ are trademarks of Digital Equipment Corporation.

See us at NCC in Booth #5316

Announcing the high-speed feature you've been waiting for in Digital's 1200-baud terminals.



Digital's tremendously popular DECwriter III and DECprinter III terminals are now available for immediate delivery.

And that's great news if you've been waiting for high-throughput terminals fast enough to print 180 characters per second. The DECwriter III and DECprinter III can do that and much more. They are both smart bidirectional printers. And come with a 1,000-character buffer for storing overflow messages.

The DECwriter III offers remarkable flexibility.

You can select line rates on the keyboard. From 50 to 9,600 baud. And choose any of five half- or full-duplex modes.

There are 45 easily selectable features. For forms handling there's line spacing, form lengths, left and right and top and bottom margins. Plus horizontal and vertical tabs. And the features you use most can be stored in nonvolatile memory. And recalled quickly.

You also get a keyboard as comfortable and easy to use as an electric typewriter.

The other popular terminal now available for immediate delivery is our DECprinter III.

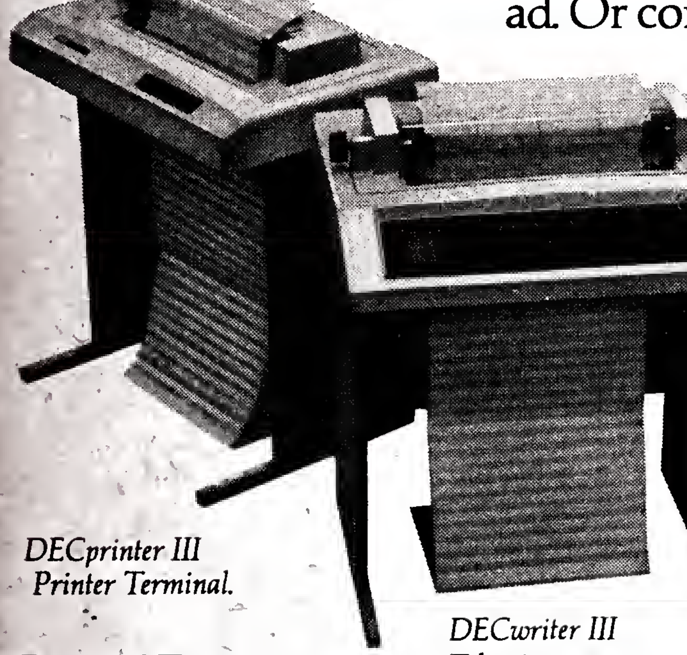
It comes with programmable margins, tabs, and forms setting. Selectable character fonts. Full ASCII character set. And EIA interface port. To name but a few.

And Digital has been setting the standard for reliability in 1200-baud terminals. So you can feel totally confident you have proven, high-performance machines.

These high-speed terminals are now in stock and ready for immediate delivery. So make a quick call to your local dealer.

Because they're so popular, we can't promise they'll be this easy to buy for long.

To buy your DECwriter IIIs and DECprinter IIIs contact your local terminals dealer listed with this ad. Or contact:



DECprinter III Printer Terminal.

DECwriter III Teleprinter.

Digital Equipment Corporation, Terminals Product Group—MR2-2/M67, One Iron Way, Marlboro, MA 01752. Tel. (617) 467-7068. In Europe: 12 Av. des Morgines, CH-1213 Petit-Lancy/Geneva. In Canada: Digital Equipment of Canada, Ltd.

digital

We change the way the world thinks.

Where to buy Digital's 1200-baud terminals.

ALABAMA
Huntsville
J.L. Highsmith & Co.
(205) 536-6666

ALASKA
Anchorage
Bagoy and Associates
(907) 274-8531

ARIZONA
Phoenix
Terminal Rentals, Inc.
(602) 258-4466
The Phoenix Group
(602) 894-9247
Scottsdale
BFA Corporation
(602) 994-5400

CALIFORNIA
Anaheim
Cal Data Lease Systems & Financial Corp.
(714) 632-6986
Burbank
Electrorent
(213) 843-3131
Kentfield
American Peripheral Exchange
(415) 461-0894
Los Angeles
The David Jamison Carlyle Corp.
(213) 277-4562
Redondo Beach
Consolidated Data Terminals, Inc.
(213) 970-1030
Sacramento
Consolidated Data Terminals, Inc.
(916) 924-1644
San Bruno
Data Access Systems
(415) 872-1811
San Diego
Data Systems Marketing
(800) 854-2684
(800) 532-3717
(Calif. only)
San Jose
Terminal Rentals, Inc.
(408) 292-9915
San Mateo
U.S. Instrument & Rentals
(415) 574-6006
Santa Clara
Continental Resources
(408) 727-9870
Tustin
Terminal Rentals, Inc.
(714) 832-2414
West Los Angeles
Carterfone Communications Corp.
(213) 879-1871

COLORADO
Denver
BFA Corporation
(303) 371-2422

CONNECTICUT
Wallingford
Computrend, Inc.
(203) 265-2841

FLORIDA
Jacksonville
Richard M. Walsh Associates, Inc.
(800) 233-4814
Orlando
J.L. Highsmith & Co.
(305) 293-5202
Pensacola
Digital Systems, Inc.
(904) 434-2685

GEORGIA
Atlanta
Electrorent
(404) 449-4800

ILLINOIS
Bensenville
Alanthus Data Communications Corp.
(312) 860-2233
Chicago
The David Jamison Carlyle Corp.
(312) 975-1500
Loonam Associates, Inc.
(312) 833-5831
U.S. Robotics
(312) 346-5650
Des Plaines
National Computer Corp.
Communications Center
(312) 296-0830
Downers Grove
Parker Business Services, Inc.
(312) 629-7806
Elk Grove
Electrorent
(312) 956-8380
Elmhurst
ICE, Inc.
(312) 279-1960
Morton Grove
Data Access Systems
(312) 967-0440
Park Ridge
M.R.C. Industries
(312) 698-3377
Westmont
Telcom Products, Inc.
(312) 960-4090
(800) 323-7385

INDIANA
Indianapolis
Computer Systems Corp.
(317) 298-7200
Command
(317) 842-3900
South Bend
Credit Bureau of South Bend
(219) 236-5600

KANSAS
Shawnee Mission
Inland Associates, Inc.
(913) 362-2366

MARYLAND
Gaithersburg
Continental Resources, Inc.
(301) 948-4310
Rockville
Alanthus Data Communications Corp.
(301) 770-1150

MASSACHUSETTS
Bedford
Continental Resources, Inc.
(617) 275-0850
Boston
American Computer Group
(617) 437-1100
Needham Heights
National Computer Communications Corp.
(617) 444-6822
Wakefield
Selecterm
(617) 246-1300
Woburn
Computrend, Inc.
(617) 272-8372
(800) 225-5378

MICHIGAN
Brighton
Dacoterm
(313) 453-7250

MINNESOTA
Minneapolis/St. Paul
Computer Marketing Corp.
(612) 894-7150
Tele-Terminals
(800) 328-3072
Minneapolis
Loonam Associates, Inc.
(612) 831-1616

MISSOURI
Ballwin
Computer Marketing
(314) 434-1844
St. Louis
Inland Associates, Inc.
(314) 821-3742

NEW JERSEY
Allendale
Leasametric, Inc.
(415) 574-4441
Blackwood
Data Access Systems
(609) 228-0700
Cherry Hill
A & W Consultants
(609) 779-7200
Fairfield
Carterfone Communications Corp.
(201) 575-6500
Matawan
The David Jamison Carlyle Corp.
(201) 946-9669
Mountain Lakes
Walsh Associates, Inc.
(717) 346-3856
Somerville
Unitronix, Inc.
(201) 874-8500
Springfield
Terminal Sales & Development, Inc.
(201) 376-8980
Union
Transnet, Inc.
(201) 688-7800

NEW MEXICO
Albuquerque
BFA Corporation
(505) 292-1212

NEW YORK
Albany
J. Cameron Associates
(518) 371-5947
Binghamton
Ossmann Instruments
(607) 785-9947
Great Neck
M.T.I.
(516) 482-3500
New York
Alanthus Data Communications Corp.
(212) 688-2615
National Computer Communications Corp.
(212) 354-9866
Rochester
Computrend, Inc.
(716) 244-1075
(800) 462-6436
J. Cameron Associates
(716) 385-1681
Ossmann Instruments
(716) 473-5720
Syracuse
Ossmann Instruments
(315) 437-6666

NORTH CAROLINA
Charlotte
J.L. Highsmith & Co.
(704) 333-7743
(800) 438-4942

NORTH DAKOTA
Fargo
Tele-Terminals
(800) 328-3072

OHIO
Akron
CBC Services
(216) 867-0780
Cleveland
Data Tron
(216) 585-8421
M.T.I.
(216) 464-6688
Columbus
CBC Services
(614) 222-5496
Dayton
C.G. Distributors
(513) 435-4340
Dublin
Scherer's Mini-Computer Mart
(614) 889-0810

OKLAHOMA
Oklahoma City
Tel-Tex, Inc.
(405) 947-3797

OREGON
Beaverton
Datec
(503) 641-6644

PENNSYLVANIA
Pittsburgh
C.G. Distributors
(412) 366-5056
(800) 245-4120
Scranton
Walsh Associates, Inc.
(717) 346-3856

TEXAS
Addison
Data Applications
(214) 931-1100
Dallas
Carterfone Communications Corp.
(214) 350-1294
Fulton Business Systems
(214) 741-6785
M.R.C. Industries
(214) 247-6341
Houston
Data Applications
(713) 686-8413
Tel-Tex, Inc.
(713) 868-6000
Richardson
Tel-Tex, Inc.
(214) 231-8077
San Antonio
Data Applications
(512) 732-7176

WASHINGTON
Redmond
Consolidated Data Terminals, Inc.
(206) 883-0100
Seattle
Datec
(206) 575-1470

WISCONSIN
Milwaukee
Loonam Associates, Inc.
(414) 548-9790
M.R.C. Industries
(414) 327-1212
Tele-Terminals
(800) 328-3072

CANADA-BRITISH COLUMBIA
Burnaby
Algo Communications Products, Ltd.
(604) 438-3333

CANADA-ONTARIO
Markham
Canterm Communications
(416) 495-5700
CES Electronic Systems Group Ltd.
(416) 495-5555
Lanpar Ltd.
(416) 495-5666
Teleterm Ltd.
(416) 677-0184
Mississauga
Data Terminal Mart
(416) 677-0184
Toronto
Hamilton Rentals
(416) 251-1166

CANADA-QUEBEC
Montreal
Spectra Colour, Ltd.
(514) 739-2153
Telcor
(514) 337-6020

CANADA-MANITOBA
Winnipeg
Electro Systems Group, Ltd.
(204) 772-9411

Executive Corner

- Richard M. Doyle has joined Magnuson Computer Systems Corp. as vice-president of contracts. Frank Juliano has been named vice-president of customer service.
- Carolyne Gatesy has been appointed vice-president and general manager of Amtech Computer Systems, Inc.
- Alexander A. Salatollo has been named vice-president of marketing and sales at Benson, Inc.
- John Tincler has been promoted to executive vice-president of Centronics Data Computer Corp. Charles Bickoff has been promoted to vice-president of advanced development; Neil Kleinfeld has been promoted to vice-president of – marketing and planning; Warren Allen has been promoted to vice-president of field operations; Jack Garrity has been promoted to vice-president of sales; Ralph Eichstaedt has been promoted to vice-president of field engineering; Bob Murphy is now vice-president of human resources and Robert Kilcullen is vice-president of business management.
- Francis Siu has been named vice-president of operations for Advanced Electronics Design, Inc.
- Steven D. Sass has been appointed vice-president of management systems at ARD Corp.
- A.E. Vierling has been promoted to vice-president of operations at Computer Technology Corp.
- Allan S. Conner has been elected a vice-president of National CSS, a Dun & Bradstreet Co. subsidiary.
- Richard M. Doyle has joined Magnuson Computer Systems Corp. as vice-president of contracts.
- Alan Ware has been promoted to vice-president and general manager of domestic end-user products at Scan-Optics, Inc. Clarence Rife has been promoted to vice-president and general manager of customer service; Richard Hamlin has been appointed vice-president and general manager of software services and John Anderson has been named vice-president of finance and administration, secretary and treasurer.
- Frederic H. Sweeny has joined Lee Data Corp. as vice-president of sales.
- Seymour Bogitch has been appointed senior vice-president for Tandy Electronics Manufacturing, a division of Tandy Corp.
- Kenneth H. Lassig has been elected vice-president for finance at RCA Global Communications, Inc.
- Dr. Otto Butsch has been promoted to vice-president of research and development engineering at Micro Peripherals, Inc.
- James V. Seiffert has joined Century Computer Services, Inc. as vice-president of systems and programming.
- Bruce K. Barnard has joined BDS Corp. as vice-president of marketing.
- John C. Butler has been named executive vice-president of worldwide marketing and services for Sperry Univac.
- Charles W. Bachman has joined Cullinane Database Systems, Inc. as vice-president.
- Philip W. Evans has been named vice-president of marketing at Ferox Microsystems, Inc.
- Morton Jaffe has been appointed executive vice-president of QI Corp.
- Bruce R. Rusch has been appointed vice-president and general manager of the Modicon Division of Gould, Inc.; Walter L. Bennett has been appointed vice-president of marketing, Peter M. Alberico has been appointed vice-president of finance and administration and J. Lawrence Doherty has been appointed vice-president of strategic planning for the Electronic Systems Group.
- Peter C. Waal has been named vice-president of Lexico Enterprises, Inc. and general manager of the Systems Development Division.
- Geoffrey Salkeld has been appointed general manager of the Commercial Systems Division at Computer Automation, Inc.
- Gary Kaebisch has been appointed general manager at Harris Data Service, Inc. and David Sizemore has been named systems and marketing manager.
- John J. Pappas has been appointed president and chief executive officer of Teletype Corp., a subsidiary of Western Electric Co.
- Lloyd D. Turner has been named president and chief operating officer of Floating Point Systems, Inc.
- Michael Furnman has been appointed to the board of directors of Data Terminals and Communications and IDTC, the international marketing arm of DTC. He has also been named vice-president of marketing.
- Michael J. Kelley, John N. Shevillo and Gary F. Smith have been promoted to vice-presidents of marketing at CMI Corp.
- Stuart A. Voorhies has been named vice-president of marketing for the Government Services Division of Electronic Data Systems Federal Corp.
- Franklin J. Sekera has been appointed vice-president and general manager of Continental Power Systems, Inc., a subsidiary of The Continental Group.
- Donald F. Orr has been appointed senior vice-president and general manager of Pertec Computer Corp.'s Systems Division.
- Lovell C. Chase Jr. has been appointed vice-president of sales at Microdata International Corp.

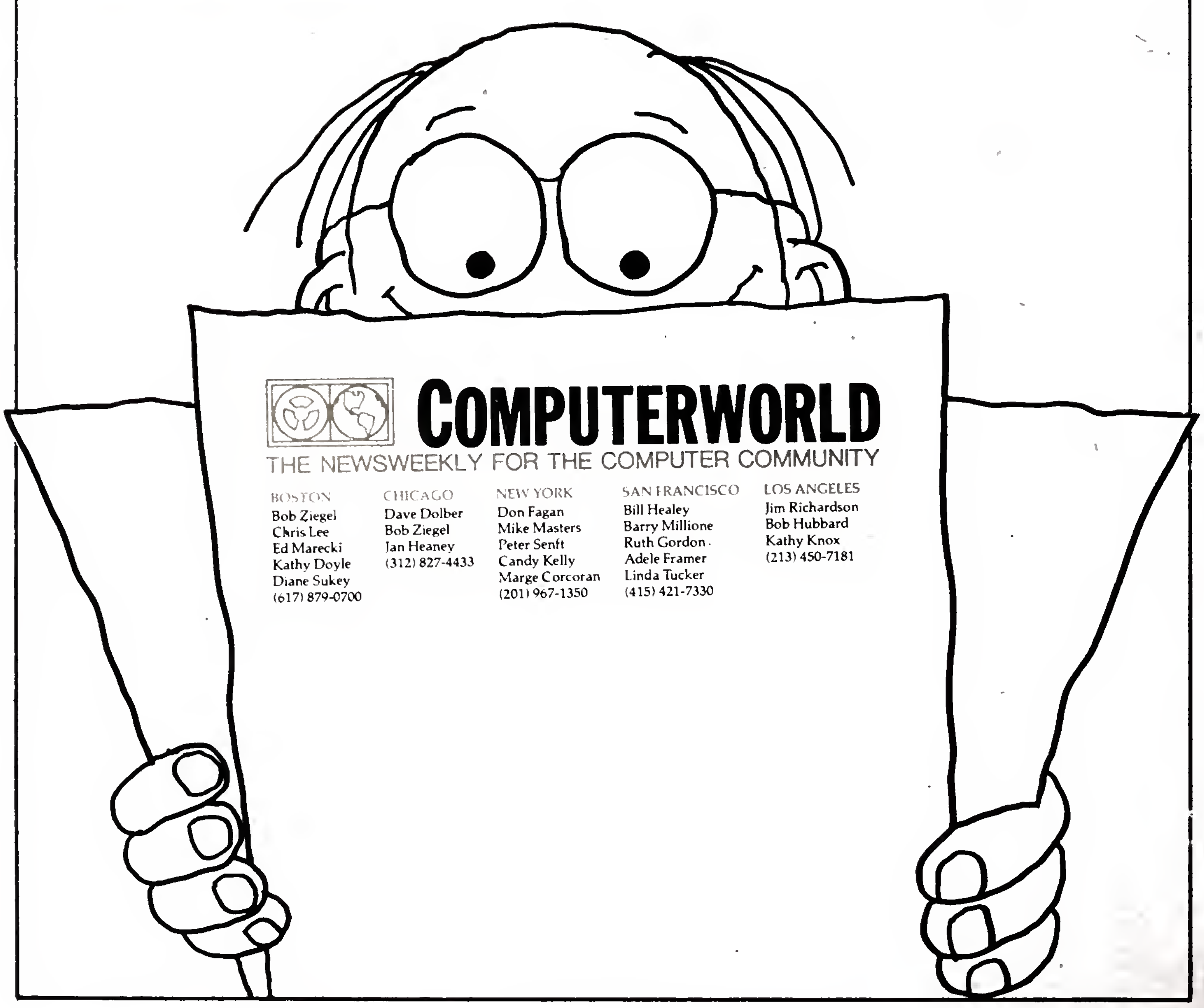
Computerworld can't cover NCC in one issue. That's why we're covering it in three.

We start with our April 27th National Computer Conference Preview Issue. Everything you need to know about the show before it's happened. We'll include the sessions, tell you who's speaking, review the exhibitors and what they'll be exhibiting. You'll even read about Chicago nightlife and where to go when you're not at the show. Extra issues will be distributed at the *Computerworld* booth at NCC. Black and white ad close is April 17th. Color close is April 10th.

Then our NCC Show Issue comes out May 4th, the day of the show. It will have last-minute show information, speech previews and other show details. Pick up a copy at the *Computerworld* booth. Black and white ad close is April 23rd. Color close is April 17th.

Finally, our May 11th NCC Wrap-up Issue will have complete coverage of all that happened, prepared by our 25-person editorial staff. You'll read who said what, who introduced what and how it works, and review the show's features and highlights in words and pictures. Black and white ad close is May 1st. Color close is April 24th.

Contact your *Computerworld* representative for complete ad details for any or all of these Special Issues. Or, to reserve ad space, call Frank Collins, at (617) 879-0700.



Detach here, moisten and seal envelope securely before mailing.

Fold and insert order form (attached through binding) and remittance here.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 709 FRAMINGHAM, MA 01701

postage will be paid by

CIRCULATION DEPARTMENT
COMPUTERWORLD
375 Cochituate Road, Rte. 30
Framingham, MA 01701

Nickels & Dimes

Bolt, Beranek and Newman, Inc. has called a special meeting to consider a proposal by the board to increase the authorized capital stock of the company. If the increase is approved by shareholders, the board has authorized a three-for-two stock split of the common stock of the company, to be effected by means of a 50% stock dividend. The stock dividend would be payable May 1 to holders of record on April 16.

$ $ $

Comserv Corp. has announced it intends to file a registration statement for a public offering of 300,000 shares of its common stock. The proceeds of the offering, which is expected to be made in April, will be used to increase working capital.

$ $ $

Avanti Communications Corp. has completed a $1 million private placement with Business Development Services, Inc. (a subsidiary of General Electric Co.) and Trans Venture AG (a subsidiary of Trans KB). Avanti also completed the repurchase of shares of common stock owned by M/A-COM, a Burlington, Mass. company, and terminated all merger discussions with M/A-COM.

$ $ $

The American Stock Exchange traded 1,599,839 common shares of **T-Bar, Inc.** Trading under ticker symbol TBR, the newly listed issue opened on 100 shares at 20-3/8.

$ $ $

Safeguard Business Systems, Inc. has announced a 20% increase in its regular quarterly cash dividend. The dividend of 8 cent/share was scheduled to be paid on April 1 to shareholders of record on March 19.

$ $ $

Storage Technology Corp. has announced that Storage Technology Partners, a research and development limited partnership, has completed its $50 million equity financing. The proceeds of this financing will be used to develop a family of high-performance mainframes for the IBM software-compatible market.

$ $ $

Sun Co., Inc. expects to report first-quarter earnings significantly below those reported for the first quarter of 1980. Sun's reported earnings for the first quarter of 1980 were $251 million, or $2 per share.

$ $ $

Computer and Communications Technology Corp. plans to file a registration statement under the Securities Act of 1933 covering a proposed public offering of 500,000 shares of its common stock.

$ $ $

Data Dimensions, Inc. incurred a net loss in 1980 of $692,500, 65¢ per share, on revenues of $5,401,700, compared to 1979's net loss of $1,686,700, $1.55 per share, on revenues of $11,524,800.

Compuserv Corp. has approved a three-for-two stock split in the form of a 50% stock dividend payable on June 1 to stockholders of record May 25. The company also announced it has filed a registration statement with the Securities and Exchange Commission for the public offering of 400,000 shares of common stock to a group of underwriters led by Piper, Jaffray and Hopwood, Inc. The purchase of shares in this offering will be made on a pre-split basis.

$ $ $

Nuclear Data, Inc. declared a 25% distribution in the nature of a stock split payable on May 20 to stockholders of record at the close of business on April 20. The company also announced that it has received $250,000 from General Electric Co. in settlement of its lawsuit against GE.

$ $ $

Emulex Corp. has announced the public offering of 742,869 shares of the company's common stock at a price of $12 per share, of which 317,156 shares are being offered by shareholders of the company.

$ $ $

Casino Technology Corp. has filed a registration statement with the Securities and Exchange Commission for the initial public offering of the firm's common stock. The company intends to sell 1,250,000 shares at approximately $88 per share.

Orders & Installations

The Organization for Industrial Research, Inc. has received three additional orders. General Electric Dominion Engineering, Montreal, has contracted for the installation of Miplan on a DEC PDP-11/70 with RSX-11M operating system; and Western Gear, Inc., Lynwood, Calif., has bought Miplan for installation on a DEC PDP-11/70 with IAS operating system.

Northern Telecom, Inc.'s Electronic Office Systems, has received a $750,000 order from NMF, Inc., Charlotte, N.C., for Model 350 intelligent terminal systems.

Data Systems of Connecticut, Inc. has received more than $200,000 in local orders for small business computer systems. The new orders include scheduling and accounting systems for Kops-Monahan, Inc. (radio stations WKCI and WAVZ), New Haven; wire inventory, order processing and accounting systems for Jelliff Corp.; scheduling, billing and profile matching systems for Stamford Racquetball, Inc.; billing and inventory systems for Banney Systems, Inc.; and billing and inventory for Leatherman, Inc.

Medicine Shoppe International Stores, Inc. has ordered 300 Compass pharmacy computer systems from Honeywell, Inc.

CICS/VS, MVS, TSO/SPF ...?

If you only see a question mark when someone mentions CICS, MVS, VSAM, or TSO/SPF it may be time to find out more about these state of the art topics. Keeping up with these topics will also help you keep ahead of the current rate of inflation. At SOFTWARE INTELLIGENCE LABORATORY's education facility you will learn all that is required to begin design and coding of CICS/VS applications in macro and command level. However, the SIL approach goes one step further than other conventional courses. In addition to teaching in a lecture environment we provide "hands on" programming workshops using TSO/SPF for program development in an MVS environment with testing and debugging using CICS/VS R1.5. Our students are taught VSAM from the outset of the course to eliminate the cloud surrounding this topic.

COURSES START MAY 1 (hours are flexible on weekdays, weekends, and evenings)

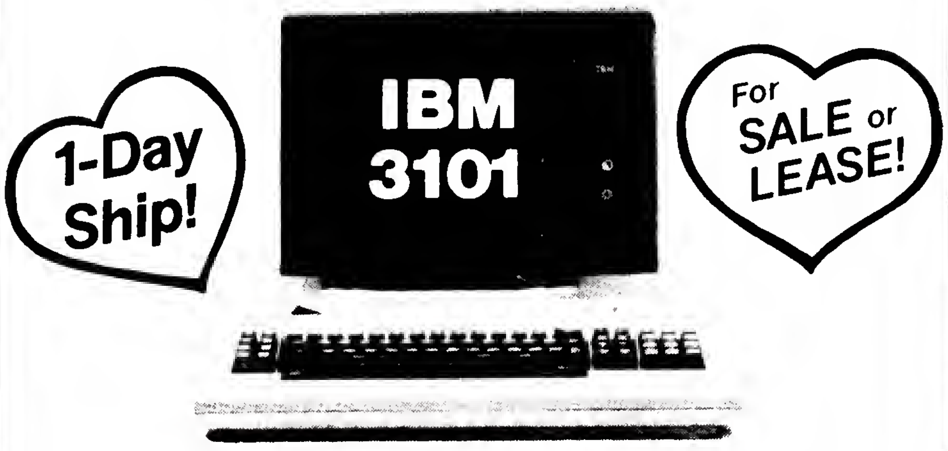
IF YOU FEEL THIS COURSE SOUNDS ATTRACTIVE WHY NOT GIVE US A CALL OR WRITE US NOW!

SIL

SOFTWARE INTELLIGENCE LABORATORY, INC.
50 BROAD ST. SUITE 1014
NEW YORK, N.Y. 10004
(212) 747-9066,7,8

AMERICAN for TERMINALS

"Your eyes, ears and fingers will love it."



but you will love OUR Price & Delivery More!

CALL 617-437-1100.

AMERICAN COMPUTER GROUP, INC.
P.O. Box 68, Kenmore Station, Boston, MA 02215

POSITION ANNOUNCEMENTS

ROCKWELL'S ROCKY FLATS PLANT IN COLORADO

has an immediate opening for:

SYSTEMS ANALYST

Position requires a BS degree in Computer Science, or equivalent with a minimum of two years experience in the design and implementation of large Data Processing systems. Individual will serve as a team member to design and implement a new online accountability system. Responsibilities include interfacing with programmers and developing program specifications.

Benefits Include:

Paid vacation, group insurance, dental plan, paid holidays, retirement plan, credit union, modern and safe working conditions and many more.

Submit resumes in confidence to:

Mrs. Janell Romano
Employment Dept.
Energy Systems Group
Rockwell International
Rocky Flats Plant
P.O. Box 464
Golden, CO 80401

Rockwell International

...where science gets down to business

Equal Opportunity Employer M/F. U.S. Citizenship Required.

TANDEM/16 Programmers

State-of-the-art! Challenging Environment!

One of the world's largest and most successful manufacturers of vision care products and scientific instruments has an outstanding opportunity for Tandem 16 Programmers.

Our environment includes an IBM 370/168 and Tandem 16 (4 C.P.U.) with fifty terminals. You should have experience in TAL or COBOL and a working knowledge in several areas involving PATHAWAY, ENFORM, ENSCRIBE or ENVOY.

You will have a ground-floor opportunity to participate in all phases of our on-line systems development. These openings are located in Rochester, New York, a city known for its educational, cultural and recreational resources.

Please forward your resume, in confidence, to:

Donald W. Lewis

BAUSCH & LOMB
P.O. Box 22403, Rochester, NY 14692

An Equal Opportunity Employer, M/F

CCS

SERIES/1 ASSEMBLER LANGUAGE PROGRAMMERS

- Minimum 3-5 years Assembler Language experience (at least one year of which is on the Series/1)
- Candidate should be familiar with RPS
- Knowledge of CM/1 is a plus

Positions available in Northeast United States as well as in the Near East. Moderate amount of travelling will be required.

Good salries (tax free for overseas assignments), exceptional benefits, housing provided for overseas assignments. Certain locations provide up to 2 months vacation per year with a minimum 1 month vacation per year.

Working contract for 2 years.

Submit resumes to the following U.S. address:

Mr. Stuart Revo
Laessig, Brown, Revo & Hearn
1015 15th Street NW
Suite 1100
Washington, D.C. 20005

Interviews will be held in late April or early May.

Gulf Computing Systems

COORDINATOR OF TIME-SHARING SERVICES

Effective June 1, 1981, Western Illinois University will have an opening for an MICC Coordinator. MICC (Mid-Illinois Computer Cooperative) is a cooperative time-sharing network serving 9 major Illinois universities. Duties include consulting with faculty and students concerning software problems, conducting user training seminars, developing new applications, and representing WIU at Coordinator meetings. Minimum requirements include a bachelors degree in Mathematics, Statistics, Computer science, or a closely related field, expert knowledge of several computer languages (FORTRAN and BASIC a must), experience with time-sharing, and 1-2 years of related experience, preferably in a university environment. Knowledge of SPSS and CDC hardware and software a plus.

This is a 12-month, administrative position. Salary based on experience and qualifications. Send resume and references to:

Mr. Tate Lindahl
Computer Center
Western Illinois University
Macomb, IL 61455
309/298-1177

Deadline for applications: May 4, 1981
An Equal Opportunity/
Affirmative Action Employer

HONEYWELL - 6000

Prominent elect. mfr. seeks forward-thinking & results-oriented indiv. for new proj. develop. Must understand proj. life cycle concepts. Will learn data base. Salary $27,000 range. (Fee Paid). Contact Gerry Battista.

Robert Half of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200
Personnel Consultants

PROGRAMMERS . . . Consult with us!

Be an integral part of our growing software consulting firm. As an employee of Cameron Programming Consultants you will have the opportunity to work on our varied, nationwide client contracts, learn new hardware and software and attain the satisfaction that comes from seeing a job through from beginning to end.

We are seeking Programmer/Analysts with several years' experience on large IBM mainframes and skills in COBOL, IMS and CICS. We are also looking for individuals with banking and IBM System 38 experience.

From our six branch offices we are currently staffing assignments in the San Francisco, Santa Clara, Los Angeles, Orange County, Dallas, Houston, Phoenix, and Tucson areas. Please write or call collect to one of our regional centers today and learn what it means to be a Cameron employee.

SAN FRANCISCO
333 Market Street
Suite 1730
San Francisco, CA 94105
(415) 957-9600

HOUSTON
1900 West Loop South
Suite 1180
Houston, Tx 77027
(713) 623-6300

ORANGE COUNTY
18952 MacArthur Boulevard
Suite 440
Irvine, CA 92715
(714) 851-1599

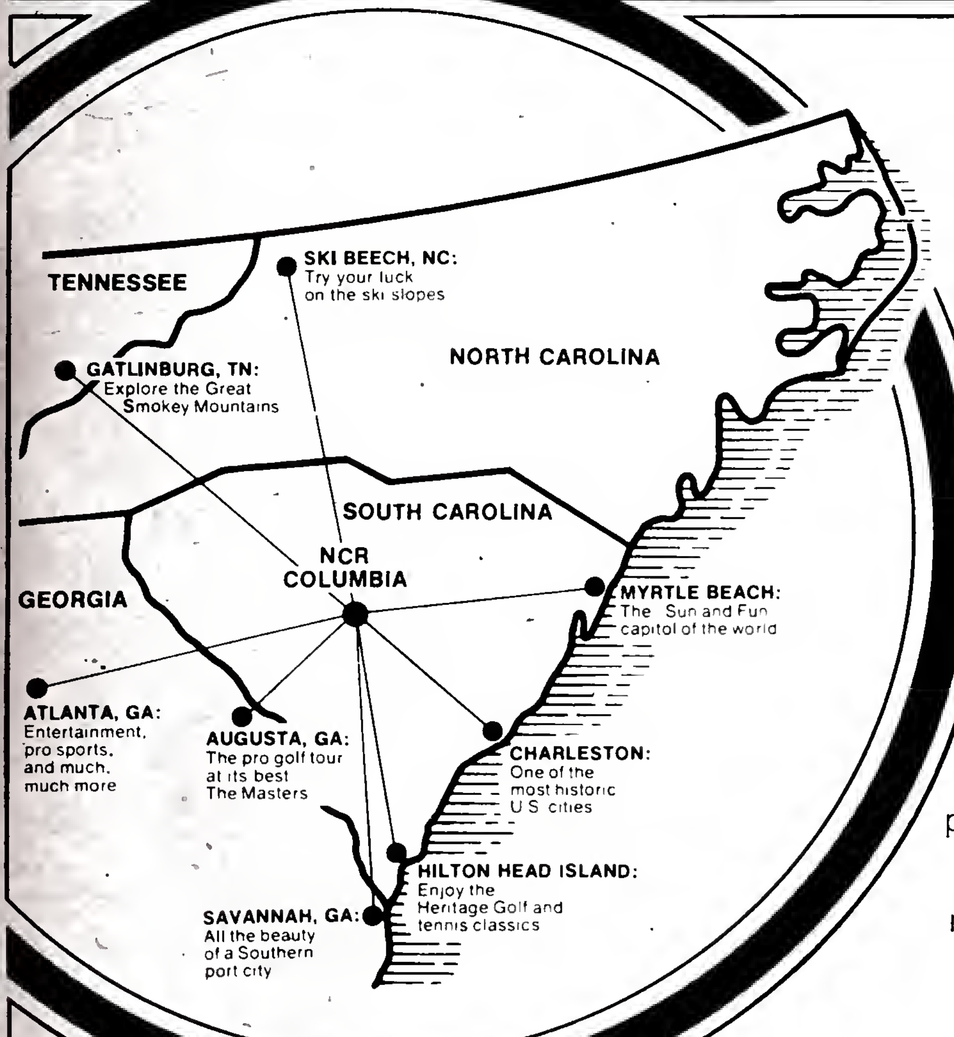
CAMERON PROGRAMMING CONSULTANTS

Equal opportunity employer M F H

Systems Analysts, Programmers & Engineers

Take your place in the sunbelt

developing Data Communications, Word Processing and Microcomputer Systems at NCR/Columbia, S.C.


TENNESSEE
SKI BEECH, NC: Try your luck on the ski slopes
GATLINBURG, TN: Explore the Great Smokey Mountains
NORTH CAROLINA
SOUTH CAROLINA
NCR COLUMBIA
GEORGIA
MYRTLE BEACH: The Sun and Fun capitol of the world
ATLANTA, GA: Entertainment, pro sports, and much, much more
AUGUSTA, GA: The pro golf tour at its best The Masters
CHARLESTON: One of the most historic U.S. cities
HILTON HEAD ISLAND: Enjoy the Heritage Golf and tennis classics
SAVANNAH, GA: All the beauty of a Southern port city

Opportunity is nothing new at NCR Columbia, one of the sunbelt's most attractive cities. Since our inception in 1975 we have had a continued record of growth and technical achievement for both staff and management personnel. This growth continues as we double the size of our R&D facility for occupancy this April.

The systems designed here use the last word in microprocessor and data communications technology. They'll be determining much of NCR's future in a broad line of retail, financial, and other business and commercial applications where they function as terminal peripherals, communication controllers and front end processors. We are also responsible for the development of word processing and office automation systems.

and here is our life style . . .

Columbia—state capitol and model city—offers choice of city, suburban or country living. Winters are mild and snow-free. Some of the finest recreational areas in the country are within an easy drive and can be enjoyed year 'round. Columbia is the home of the University of South Carolina. Four other colleges are nearby.

Feeling the housing crunch? Along with fine rental values, our real estate prices and taxes are among the lowest in the country. Mortgage assumptions are often at low interest rates. Professional environment. Living environment. It all adds up to exciting possibilities you should be exploring.

Openings now available for candidates with a minimum of three (3) years experience in any of the following areas:

COMMUNICATIONS

Software

- **Asynchronous and Synchronous Protocols**
- **Bit Oriented Protocols**
- **SNA Familiarity**
- **X. 25**
- **Cluster Controllers**
- **Concentrators**
- **Front End Processors**
- **Network Engineering**

Hardware

- **Adapters**
- **Analog and Digital Modems**
- **Local Area Networks**
- **Network Analysis/Technical Control**
- **Communication Diagnostics**

MICROCOMPUTER SOFTWARE

- **16 Bit Microcomputer System Definition**
- **Software Tools**
- **Operating Systems Design**
- **Real Time High Level Languages**
- **Distributive Systems**

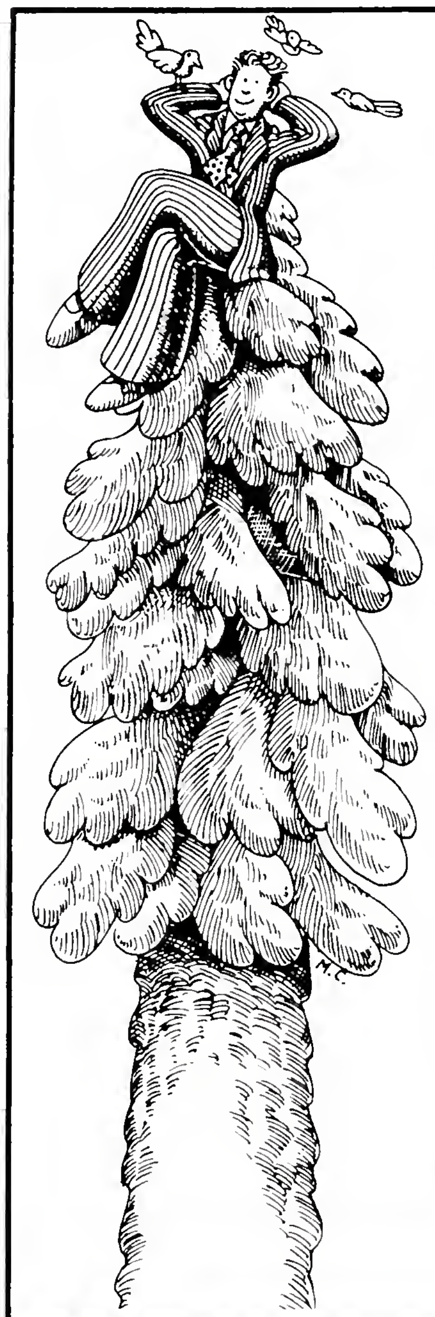
WORD PROCESSING/ OFFICE SYSTEMS

- **Office Systems Networks**
- **Office System Architecture**
- **Advanced Development of Office Products**
- **Application Software Development**
- **Text Editing**
- **Administrative Maintenance Work Station**
- **PABX**
- **Integrated Voice System Data**

Send a resume and salary history to:
Mr. Glenn Rannick, NCR Corporation,
Engineering & Manufacturing,
Dept. 54C, 3325 Platt Springs Road,
West Columbia, South Carolina 29169

NCR
Complete Computer Systems

An Equal Opportunity Employer



The most livable city in America has a few openings.

The city is Portland, Oregon. Big enough to be stimulating, small enough to be comfortable. And too beautiful to be believed.

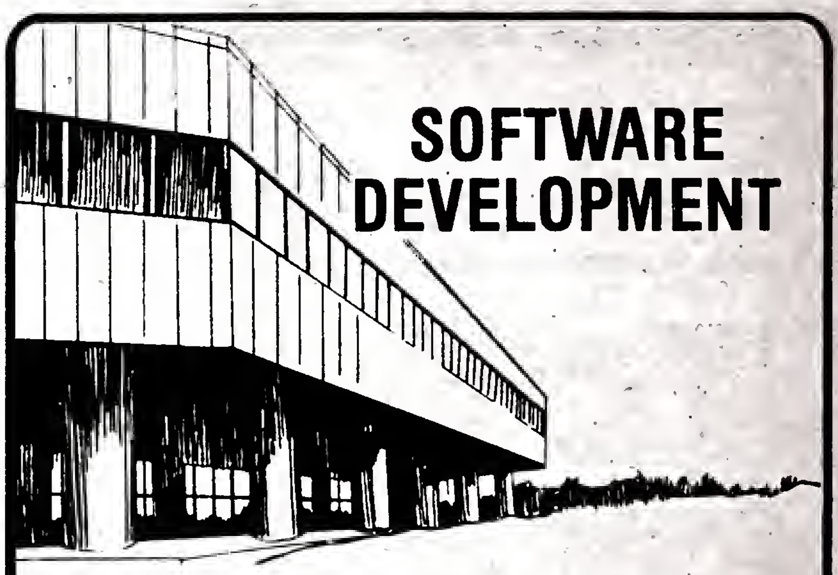
The openings are for Programmer Analysts at Crown Zellerbach, in our systems development group. We stand tall in the forest products industry; in fact, we're the second largest paper company in the U.S.

Join our expanding staff. We're looking for someone who's been programming in an IBM OS/COBOL environment (2-4 years) and has system design experience preferably in a manufacturing environment. Someone who has a BS degree in Business, Computer Science, or a related field. And someone with excellent communication skills.

If that sounds like you, and you want to enjoy your work and the city you live in, call **(503) 221-7277.** Or send your resume to Pete Shipp at Crown Zellerbach, 1500 S.W. First Avenue, Portland, OR 97201. An Equal Opportunity Employer F/M. No agency referrals, please.

CrownZellerbach

© 1981 Crown Zellerbach



SOFTWARE DEVELOPMENT

APPLIED DATA RESEARCH has several openings for intermediate and senior level programming personnel. Positions involve assignments in software development for the following ADR product groups: **VOLLIE®**, **DOS/LOOK®**, **MetaCOBOL®**, **On-line ETC®**, and **The LIBRARIAN®**. These positions will also involve you in new product development.

Candidates must have a minimum of 2 years programming experience and strong IBM Assembly language skills.

APPLIED DATA RESEARCH offers a very competitive salary commensurate with your background and potential and a comprehensive benefits package which includes semi-annual bonuses and dental, prescription drug, and tuition assistance plans. In addition, ADR offers an environment uniquely suited to DP professionals. For more information please forward your resume or call Mr. Ed Smith, Director of Personnel, collect at (201) 874-3033. All inquiries held in strict confidence.

APPLIED DATA RESEARCH, INC.
Department CSD
Route 206 and Orchard Road, CN-8
Princeton, New Jersey 08540

An Equal Opportunity Employer, M/F/H/V

ADR

Software Engineers

San Francisco Peninsula

We're Fairchild Automatic Test Equipment—THE LEADER in the ATE Industry, and our commitment to staying ahead means plenty of opportunities for key Software Engineers who are eager to join a winner.

The individuals we seek will have 4-6 years of experience with a background in real-time operating systems, Assembly language, and real-time systems programming. Qualified professionals will be involved in systems programming for large-scale real-time computer-controlled electronic test systems.

For immediate consideration, please forward your resume to **Professional Staffing, Dept. CW-217, Nadine Falie, 1725 Technology Drive, San Jose, CA 95110.**

As an affirmative action employer, we encourage women, members of minority groups and the handicapped to apply.

FAIRCHILD
A Schlumberger Company
AUTOMATIC TEST EQUIPMENT

GET AN EDP JOB ANYWHERE

Analysts, project leaders, programmers with more than a year's experience let us help you find a better job. For a decade we have been placing EDP professionals like you all over the country through our network of 26 national offices. Send your resume or call

Electronic Systems Personnel
858 TCF Tower 121 So. 8th Street
Minneapolis, MN 55402
client companies assume our fee.

esp
EDP Placement Specialists

A Member of National Computer Associates

SYSTEMS ANALYSTS AND PROGRAMMERS FOR SUNBELT LOCATIONS

Job dissatisfaction, complacency, and frustration are the biggest obstacles to overcome to achieve one's career goals Everyday new career opportunities pass us by because we are unaware of their existence Let us keep you abreast of what your true value is in the market place Absolutely no obligations, please call Keith Reichle, Data Processing Specialist

Dunhill
of CHARLOTTE, INC
One Fairview Plaza Suite 406
5950 Fairview Road Charlotte NC 28210
704 554 8771

LANDRUM & BROWN

Programmer/Analyst

Landrum & Brown is an international management consultant firm specializing in Airport planning and design. We currently have a position for an individual who can apply quantitative computer skills to the solution of complex problems. Our requirements are:

- B.S. Degree
- Computer programming experience with large systems, such as Harris, IBM 360-370 & CDC.
- Thorough knowledge of Fortran, also Cobol or Assembler knowledge helpful.
- One to three years work experience.

For immediate consideration, please send your resume, including salary history and requirements, in strictest confidence to:

Bob Sanfilippo
LANDRUM & BROWN
290 Central Trust Building Cincinnati, Ohio 45202
AN AFFIRMATIVE ACTION EMPLOYER M/F/H/V

Datacom Sales

\$50,000 To \$75,000+

New Jersey/Fairfield, Conn.

If you are a top producing Datacom salesman, and know the networks and decision makers in New Jersey, this is a bona fide opportunity to earn \$75,000. Will organize territory around your contacts in N.Y. Metro Area. Products include statistical muxes, communication processors, modems, etc. Write only:

the technology consortium
P.O. Box 619 Huntington, N.Y. 11743

WHEN WHAT YOUR CAREER NEEDS IS BETTER DIRECTION

Direct your career
to the right position
anywhere in the USA

Botal Associates offers over 10 years of specialized DP placement expertise and much more. A unique computerized "Job Bank" maintains up to the minute job opportunities in your local community, as well as on a national basis. Fees paid by client companies.

If you have 1 year or more experience send your resume or call:

Botal Associates, Inc.
7 Dey Street
Suite 410
New York, N.Y.
10007
(212) 227-7370

THE EASIER WAY

Member of National Computer Associates

Hardware/MSEE BSEE/Software

If you have 1 or more years experience in any of the following areas: Electrical Electronic, Analog-Digital Ciruits, Systems Design or Development, Mini-Micro Processors, Project, Process, Test Controls or Instrumentations and possess a BSEE and or a MSEE and would like your career handled by a service that specializes exclusively in Electrical Engineers on a nationwide basis then send your resume in confidence to:

SOUTHERN ENGINEERING SERVICES
P.O. BOX 2045
SARASOTA, FLORIDA 33578.

"A PERSONAL SERVICE FOR ELECTRICAL ENGINEERS"

CALIFORNIA

Come to California where we have a fantastic year-round climate. Recreational facilities include the ocean, mountains (skiing) and the desert. Immediate requirements for:

- ★ PROGRAMMERS - COBOL, ALC
- ★ SR. PROGRAMMER ANALYSTS
- ★ PROJECT LEADERS
- ★ SOFTWARE - COMMUNICATIONS
- ★ IMS - DATA BASE

Call collect or send resume.

SUPERIOR RESOURCES
Personnel Servicas - Employer Retained
17141 Ventura Blvd. #200
Encino, (L.A.) CA, 91316
(213) 986-4400

MOVE SOUTH NOW!

Don't walt anothar wintar! Wa work with ovar 3,000 sunbalt companies. Our computer will match your skills to thair needs. Cliant companlas pay all fees. Sand rasuma to: **Dala Processing Dept.**

LANDRUM
Personnel Associates
P.O. Box 1373C
Pensacola, Florida 32596
CALL TOLL FREE (800) 874-2407

Data Processing Management Association

This is to certify that John Jones

CODE OF ETHICS

I acknowledge:

When it's time to settle down to a career, instead of another job...Robert Half.

Our offices have specialized in finding the best edp positions for more than 30 years.

ROBERT HALFSM
edp, accounting and financial personnel specialists

• ALBUQUERQUE • ALLENTOWN • ATLANTA • BALTIMORE • BIRMINGHAM • BLOOMINGTON (MN) • BOSTON • BUFFALO
CHICAGO • CINCINNATI • CITY OF COMMERCE (CA) • CLAYTON • CLEVELAND • CLIFTON (NJ) • COLUMBUS • DALLAS
DAVENPORT • DAYTON • DENVER • DES MOINES • DETROIT • FORT LAUDERDALE • FORT WORTH • FRESNO
GRAND RAPIDS • GREENSBORO • HARTFORD • HAYWARD • HOUSTON • INDIANAPOLIS • JACKSONVILLE • KALAMAZOO
KANSAS CITY • LEXINGTON • LONG ISLAND • LOS ANGELES • LOUISVILLE • MEMPHIS • MIAMI • MILWAUKEE
MINNEAPOLIS • NEW HOPE (MN) • NEW ORLEANS • NEW YORK • OAK BROOK (IL) • OMAHA • ORANGE (CA) • ORLANDO
PALO ALTO • PHILADELPHIA • PHOENIX • PITTSBURGH • PORTLAND • PROVIDENCE • RICHMOND • SACRAMENTO
ST. LOUIS • ST. PAUL • SALT LAKE CITY • SAN ANTONIO • SAN FRANCISCO • SAN JOSE • SCHAUMBURG (IL)
SEATTLE • STAMFORD (CT) • TAMPA • TULSA • WALNUT CREEK (CA) • WASHINGTON D.C. • WILMINGTON
CANADA: CALGARY • TORONTO • VANCOUVER • GREAT BRITAIN: BIRMINGHAM • LONDON

© 1980 R-H INTERNATIONAL, INC.

TELECOMMUNICATIONS

CONSULTANT/ MANAGER

Our San Francisco Bay Araa client is seeking an individual who can design, install and operate data communication systams. This position requires a strong background in both voice and data communications axparience in preparing specifications for terminals, lines, modems, multiplexers, microwave equipment and telephone lines. The successful candidata must be a technical leader and mature business person. Excallant compensation package. We are consultants to management. For immediate & confidential consideration, please send detailed resume and salary history to:

CW Box 2468
375 Cochituate Rd. Rte. 30
Framingham, Mass. 01701

DP PROFESSIONALS

Advance your career in the location of your choice!

If you have a minimum of 1 year of experience, call collect (or send resume) to: **Ann Barker**

DEALY ROURKE PERSONNEL
1808 West End Bldg.
Suite 121
Nashville, Tenn. 37203
(615) 329-1771

Arizona/California/Texas/Colorado/Florida

SCIENTIFIC OR BUSINESS PROGRAMMERS

All fees and relocation paid. $18-35,000.

If you have a BSEE, BSCS, BS in Mathematics or Physics or equivalent, we need you right now.

For Business: OS/DOS/IMS/CICS/MVS/JES Prog/Anal/Systems/Data Base. All large scale installations.

For Scientific: experience in the computer, communications, semiconductor, or aerospace/defense industries.

Your name, resume, and present employer will not be given out without your permission.

For sincere personal service, please send a confidential resume to:

Dan Pullman (602) 274-5660
PULLMAN PERSONNEL
3003 North Central Ave. Suite 1706, Phoenix, Arizona 85012

Director of Customer Engineering

Excellent opportunity to form a customer engineering group from the start.

Système provides on-line systems that automate back offices of financial institutions using the DEC 11 series minicomputer. With a growing number of satisfied customers this well-financed two year old company offers you a position in which achievement is recognized and success is rewarded. You should have the following:

- Proven management skills in a 100 man or larger field organization.
- Budgetary and control experience in enabling you to forecast and direct your business.
- Technical knowledge at a level such that you can intelligently discuss problems.
- Sparing and repair plans to meet service and budgetary goals.
- An understanding of what good service means and how to achieve it.
- Successful history of recruiting, training and motivating people.

A competitive salary and incentive will be made available. Please send resume in strictest confidence to:

système

H.C. Kresge, Jr., Vice President
Système Corporation
1095 S. Semoran Boulevard
Winter Park, Florida 32792
(305) 678-8300

Equal Opportunity Employer M/F

CONSULTANTS

Accounting Resources International is a nationwide executive search firm retained exclusively by a large well established management consulting practice. Rapid growth and promotions have created consultant openings at middle and upper staff levels at various locations throughout the country.

Candidates should have an undergraduate degree and 2-8 years experience designing and implementing Information Systems in a variety of business environments.

Positions offer excellent career growth potential and salaries which range upward from $28K. Travel, in most cases, will be less than 25%. For immediate consideration, forward resume, in strict confidence, to:

ACCOUNTING RESOURCES INTERNATIONAL
CW Box 2520, 375 Cochituate Rd.,
Box 880, Framingham, MA 01701

Or for more information, call:

Chicago	(312) 641-3040	Houston	(713) 486-7037
Dallas	(214) 559-3260	New York	(212) 758-5151
Denver	(303) 779-4260	So. Calif.	(714) 855-8575

Our Clients Are Equal Opportunity Employers M/F

APPLICATIONS PROGRAMMING MANAGER

Boston Area
To $33,000

Responsible position for an unusual individual who can combine strong technical knowledge with the skill to manage a diverse staff.

Experience with financial applications especially in banking, on line systems, IBM main frame, COBOL and CICS preferred. Proven supervisory experience or project leadership required.

Contact: L. Wax
E.J. Rhodes Associates
Executive Search
10 Speen Street, Framingham, MA 01701
(617) 879-2603

New York City London Greater Boston

Director of Data Processing

Public Sector Opportunity

Central Midwest

Excellent opportunity for an ambitious systems professional in a medium size, state-of-the-art IBM installation. This person would evaluate and recommend hardware and software, prepare annual budgets, prepare and recommend long-range plans, prioritize projects, resolve conflicts among priorities, work with user groups and recommend new and innovative applications.

Candidates must have proven administrative and management skills as well as good written and oral communication skills. Public sector management and IBM mainframe experience is not required but is desirable.

Salary to mid $30's with performance increases and an excellent benefit package. Send resume, salary history and references to:

Fox & Company
Certified Public Accountants
Internationally Fox Josolyne

Fox & Company
c/o Tim DeBord
2700 Lincoln Center Building
Denver, Colorado 80264

Our client is an Equal Opportunity Employer.

TECHNOCRAT

COMPUTER/COMMUNICATION

Successful, established NY/NJ concern seeks heavily experienced Systems Analyst to head the design, implementation and operation of a 4341 based on-line financial data network & staff. Strong programming and leadership qualities required for this full time position.

CW Box 2536
375 Cochituate Rd.
Box 880
Framingham, MA 01701

SYSTEMS PROG'S.

Conn. oppty's for indiv's with tech. CICS or VTAM exp. to join growing multi-div. corp. expanding its interactive systems. Salary to $35,000 (fee paid). Contact Stan Durbas or Paul Meissner.

Robert Half of Hartford, Inc.
111 Pearl Street
Hartford Conn 06103
(203) 278-7170
Personnel Consultants

SOFTWARE ENGINEERS

Let's share our future — you'll be instrumental in technology advancement!

Sperry Univac Technical Services Division is a worldwide organization involved in the Management, Design and Development, Test and Implementation, as well as maintenance of software using multiple languages on a variety of hardware.

We are currently considering New Graduates, as well as experienced professionals, for our Western Region Operations who have expertise in the following areas: **WEAPONS SYSTEMS FIRE CONTROL * COMMAND & CONTROL SYSTEMS * ASW APPLICATIONS * AVIONICS SYSTEMS * COMMUNICATIONS/MESSAGE PROCESSING * REAL-TIME APPLICATIONS * MARINE CORPS TACTICAL SYSTEMS * MISSILE/AIRCRAFT PERFORMANCE MODELING * COBOL/UNIVAC 1100.**

If you are interested in a challenging position and living in the "Sun-Belt Area" please contact us today!

805-257-2880

Nicky Toliusis, Western Region staffing coordinator, Sperry Univac, Technical Services Division, 28035 N. Avenue Stanford, Valencia, CA 91355.

SPERRY UNIVAC

An Affirmative Action, Equal Opportunity Employer
U.S. Citizenship Required

MVS-SYSTEMS PROGRAMMERS

AMPEX is a world leader in the design and manufacture of professional audio and video tape recording equipment. At AMPEX we house the latest state-of-the-art equipment in a stimulating atmosphere of creativity and professionalism. We start with top data processing professionals and work with them to further upgrade and advance their skills in the exciting world of data processing. At AMPEX, our emphasis is on personal career development.

Our technical environment consists of: large MVS 370 as the hub of an SNA network of DOS/VSE 4300s: MVS, JES 2, TSO, IMS, CICS, ACF/VTAM, ACF/NCP and data dictionary.

As a SENIOR MVS SYSTEMS PROGRAMMER you will have an opportunity to participate in the installation, maintenance, tuning and performance management of state-of-the-art systems software: MVS, ACF/VTAM, ACF/NCP,TSO, CICS and JES 2. Experience or knowledge of capacity planning or performance management is a plus, especially any experience with BEST/1, CAPTURE/MVS, and SAS.

Located in the easily accessible South San Francisco Bay area, AMPEX offers a highly desirable benefits package, on-site employee recreational facilities and much more. You are encouraged to send your resume today to Danny Norman or call him collect at (415) 367-2103.

AMPEX

Ampex Corporation
401 Broadway
Redwood City, CA 94063

An Equal Opportunity Employer

TULSA

ENERGY = OPPORTUNITY

Tulsa energy companies have a growing need for experienced Prog/Analysts. Opportunities are available in scientific and business applications. Salaries to Mid-$30's.

2624 E 21st St. Tulsa OK 74114
(918) 747-3621

DATA PROCESSING CAREERS inc

DALLAS

PERFORMANCE ANALYST

Position requires experience in MVS hardware/software performance analysis and capacity planning. Fees, interview and relocation expenses paid by company. To Mid-$30's.

Suite 1109, Stemmons Tower W
Dallas, TX 75207. (214) 637-6360

DATA PROCESSING CAREERS inc

FT. WORTH

IMS/CICS PROGRAMMER/ANALYSTS

Growing FW companies are seeking experienced IMS or CICS professionals to assist in systems development. Relo, salary to low $30's.

Suite 911 One Summit Ave
Ft Worth, TX 76102 (817)336-4565

DATA PROCESSING CAREERS inc

KANSAS CITY

Perf Meas	$25-35k
Graphics P/A	$28-32k
IMS Software	$28-32k
Data Secu/Anal	$25-30k
IMS P/A	$24-30k
CICS P/A	$24-30k
Mini-Assembler	$22-30k
Tng/Analyst	$23-28k

6405 Metcalf Shawnee Mission,
Kansas 66202. (913) 236-8288

DATA PROCESSING CAREERS inc

ADDITIONAL TRANSLATORS NEEDED

Leading U.S. industrial translation service, based in California's "Silicon Valley," major supplier of specialized translation services to the nation's computer and related industries, invites further applications from experienced free-lance technical translators competent to translate (at professional level) computer hardware/software manuals and other technical literature from Japanese (and other languages) into English, and from English into other languages. Promising applicants will be tested. If interested in free-lance translation assignments, write or call: **AD-EX TRANSLATIONS INTERNATIONAL/USA, 3220 Alpine Road, Portola Valley, California 94025 — (415) 854-6732.**

SOFTWARE ENGINEERS, SYSTEMS ANALYSTS, PROGRAMMERS

S16K-S50K

We specialize in New England high technology and business opportunities plus nationwide listings. Send resume, in confidence w salary history to Fred Raisner

Search Incorporated
144 Westminster St.
Providence, RI 02903
(401) 272-2250

INTERMETRICS, THE FRONT RUNNER IN COMPILER TECHNOLOGY

INTERMETRICS is an innovative and growing firm involved in a wide spectrum of software development activities. We have made a special mark as the international front runner in the design and implementation of multi-targeted, highly optimizing compilers integrated into complete software development systems. We also develop sophisticated tools which are utilized as the keystones of powerful, supportive programming environments.

To help us maintain our lead in these areas, we are seeking outstanding individuals in the following highly visible key positions:

ASSISTANT PROGRAM MANAGER — to facilitate the operation of a very large compiler development project. Includes coordination of development and QA activities, preparation of customer required schedules and status reports, management of earned-value job scheduling and costing system, sub-contractor management, and personnel assignment. At least two years experience in all phases of management on a sizable software project and a basic knowledge of compiler technology is required.

COMPILER DESIGNERS — to assume lead technical roles in the design and implementation of compilers for such languages as FORTRAN, Ada, Pascal, Jovial and HAL. Technical degree (with formal compiler coursework preferred) and at least 3 years experience designing state-of-the-art compilers for a high-order language. Interest or experience in project management desirable.

SOFTWARE ENGINEERS — to direct the design and implementation of a test suite to validate a new compiler's language coverage and implementation of translation and optimization algorithms. Requirements include at least 4 years experience in the design and development of state-of-the-art software systems, prototype development or feasibility demonstration of compilers, interpreters, development tools, testing tools, automated documentation or verifiers. M.S. or Ph.D. in a technical field preferred, UNIX and/or IBM 370 experience helpful.

SUPPORT SOFTWARE SPECIALISTS — to specify, design, and implement editors, debuggers, linkers, loaders, and static analyzers in the development of user-friendly systems. Requires a technical degree and at least two years experience developing support software for high-order language systems.

We offer flexible working hours, and a results-oriented yet informal environment which encourages a variety of recreational and intellectual activities. Our outstanding benefits package includes such features as 3 weeks paid vacation, profit sharing and stock ownership plans, dues paid to professional societies and comprehensive medical, dental and life insurance.

For further information and to get a step ahead, call Karen Aylmer at (617) 661-1840 from 9:00 AM to 5:30 PM or write to:

**Personnel Department
INTERMETRICS, INC.
733 Concord Avenue
Cambridge, MA 02138**

INTERMETRICS

An Equal Opportunity Employer M/F/H

ENGINEERING PROGRAMMERS

**Are you:
Familiar with PDP-11's and/or 6502's?
Experienced in macro assembler and/or Pascal?
Equipped with an EECS, CS Bachelor's or Master's degree or equivalent?
Experienced in design and implementation of mini/micro real time systems?
Interested in cooperative projects with hardware designers developing state of the art products for the telephone and communications industries?
Looking for the high visibility of a small company atmosphere?**

If you can answer yes to most of the above and would like to work in the San Francisco Bay Area for a company offering excellent benefits we want to hear from you.

Send your resume in confidence to Personnel Manager, Badger Meter, Inc., 150 E. Standard Avenue, Richmond, CA. 94804, an EOE.

CICS

**SYSTEMS PROGRAMMER
To $40,000**

Major, prestigious medical center in desirable Sou. California location seeks systems programmer to program, develop, and maintain distributed processing network using IBM 3033, CICS/VS. Highly professional environment, superior benefits including 3 wks vacation first year. Reply in confidence to:

**Western Health Resources
P.O. Box 48919
Los Angeles, CA 90048
(213) 855-5529**

UNIVERSITY OF VERMONT SYSTEMS ANALYST

The Office of Management Information and Computing is seeking a Systems Analyst with a BA or equivalent in a math or business related field. Applicants must have at least 5 years of data processing experience, three as a systems analyst. Experience in COBOL and IBM/DOS are required. Applicants with experience in higher education application, on-line systems and DBMS are preferred. The candidate hired will be involved in the development of applications under our integrated database. We offer an excellent benefits package. Salary, mid to high twenties, commensurate with qualifications. **Send resume and 3 professional references no later than May 15, 1981 to University of Vermont, OMIC, 238 Waterman Building, Burlington, Vermont 05405.**

An Affirmative Action Employer

This is no ordinary offer!

Put more meaning and direction into your career

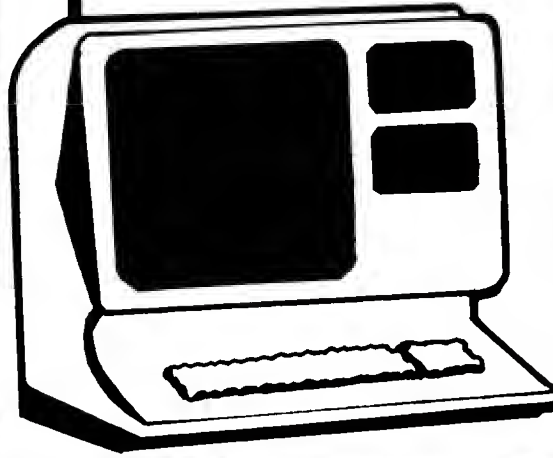
AES Data Ltd. is a high technology leader in the Canadian micro-computer industry. We manufacture and distribute a full range of hardware and software word-processing systems known throughout the world for their dependability and technical excellence.

Thanks to continuing demands for our products, we are offering intermediate and senior opportunities for top-flight technical software specialists, to keep us growing strong. Expert knowledge is especially sought in the areas of rigid disc applications, IBM protocols, general communications software, data base and records management systems. Candidates should possess a minimum of 3 years' experience with exposure to any of the above or a systems software development environment as well as a Bachelor's degree in either Computer Science or Electronic Engineering.

Our state-of-the-art work environment is project-oriented. This is a situation which gives you the feeling of meaningful involvement, creating a high level of interest in day to day work. It's a stimulating environment which encourages your participation in a wide range of technically challenging and interesting projects. The clincher, it lends itself to the development of diverse and well-rounded skills. Isn't that what you've always wanted in a computer related career?

We offer an outstanding compensation package including a complete range of company-paid benefits.

Opportunities exist in both Montréal and Toronto.



For immediate consideration, please submit your resume in complete confidence to:

Mr. Donald Bolduc,
Manager–Human Resources
AES DATA LIMITED
1111 - 46th Avenue
Lachine, Québec
H8T 3C5

Mr. Brian Celentano,
Personnel Administrator
AES DATA LIMITED
2330 Millrace Court
Mississauga, Ontario
L5N 1W2

AES

Emory University
Director of Computer Services

Emory University is seeking a Director for Computer Services. The Director reports to the Vice President for Arts and Sciences and is responsible for the management, planning and development of the University Computing Center. The Center currently provides computing services for instructional, research and administrative sectors of the University. The current central facility consists of a Univac 90/80 and multi-support equipment.

The Director is also responsible for advising the President, Vice-Presidents and Deans in shaping policy dealing with long-range planning with regard to all University computer hardware and software needs, financial management of computer services and application of information technology to the needs of the campus.

Qualifications: Advanced degree preferred. Demonstrated managerial experience preferably in an academic computing environment, interpersonal skills and leadership ability to work effectively with a diverse computer user constituency, knowledge of computer hardware and software industry, central mainframe computer systems, networking, network services, mini and micro computer systems. Salary is competitive.

Applications or nominations and resume with names, addresses and telephone numbers of at least three references should be sent by **1 July** to:

Search Committee
Director of Computer Services
407 Administration Building
Emory University
Atlanta, Georgia 30322

Emory University is an equal opportunity/-affirmative action employer. Applications from women, minorities and the handicapped are especially welcome.

ROBERT HALF

SUNBELT OPPORTUNITIES

MIS DIRECTOR.DEGREE	$55K
TECH ANALYST.PDP 1170	$45K
IS MANAGER.INFO SYS EXP	$45K
PROG/ANALYST.FIN'L COBOL	$35K
APL ANALYST.USER CONTACT	$33K
PROJ MANAGER.ACCTG DESIGN	$32K
SYS ANALYST.COBOL BACKGD	$28K
PROGRAMMER.BURROUGHS	$26K
PROG.ANALYST.RPG II	$23K
SYSTEMS PROG.DOS/OS/CICS	$35K

JERRE BROWN
ROBERT HALF
OF LOUISIANA, INC.
135 St. Charles Ave., #1020
New Orleans, LA 70130
(504) 524-3773

Our products serve the energy and natural resource markets

Joy Manufacturing Company, headquartered in Pittsburgh, is a multi-divisional company employing over 13,000 people worldwide. The mining machinery division is the world's largest manufacturer of underground mining machinery with almost 60 years of experience serving the coal industry. Our 2,300 employee facility in Franklin, Pennsylvania has immediate openings for 2 systems professionals in our 40 member MIS Department. Both openings are the result of recent promotions.

LEAD SYSTEMS ANALYST/ PROJECT LEADER

SYSTEMS ANALYST

We are looking for 2 individuals with strong track records in the development of state-of-the-art manufacturing control systems. Candidates should have a strong desire to become a part of a successful effort to achieve Class A MRP II operation in a complex, dynamic manufacturing environment.

The successful candidate for the Lead Analyst position must be able to function effectively as a project/team leader on major development projects, coordinating the efforts of 5-6 systems professionals. The person selected for the Systems Analyst position must be able to work independently, to act as a project leader on system enhancements and smaller development projects, and to function as a team member on larger development efforts. Both candidates must understand the need for, and be committed to the use of, a formal systems development methodology and associated standards.

These positions report to the Applications Development Manager, Manufacturing Systems. A Bachelors degree is preferred, equivalent experience is acceptable. An advanced degree, a CDP and/ or APICS certification would be definite pluses. The Franklin Data Center houses dual 370/148 processors in a DOS/VS, COBOL, CICS, DBOMP environment with heavy emphasis on on-line, real time processing. DOS/VSE and DL/I conversions are under way. Located in a new administration building complex on the banks of the Allegheny River, the MIS department is a people oriented organization deeply committed to professionalism, personal development, and active involvement in the divisions unique human resource management programs.

We offer competitive salaries, excellent fringe benefits, a liberal relocation package and a rural environment, rich in history and scenic beauty. Franklin is a small, but progressive community within easy driving distance of Pittsburgh, Cleveland and Erie.

Please submit resume with salary history and requirements in confidence to:

Personnel Supervisor
JOY MACHINERY COMPANY
P.O. Box 791
Franklin, PA 16323

JOY Manufacturing Company

JOY

We Are An Equal Opportunity Employer M/F

DATA PROCESSING CONSULTANT

Development Technologies

San Francisco

A most unusual opportunity exists for a Technical Consultant to research, develop and implement new systems methodologies. The qualified candidate should possess:

- Experience in State-of-the-Art structured programming and design techniques, and systems development life-cycle methodology.
- Managerial and planning experience.
- A strong desire to be a Pioneer in leading-edge technology.

Salary commensurate with experience and abilities. We are consultants to management. Please send resume in confidence, to: **CW Box 2543, 375 Cochituate Rd., Box 880, Framingham, Mass. 01701.**

Employer assumes fee

DATA PROCESSING

Sohio Petroleum Company is responsible for the exploration and development of petroleum resources for Standard Oil of Ohio. Our success on the Alaskan North Slope is the basis for an aggressive exploration program.

Computer Applications Geologist/Geophysicist

The rapid expansion of our distributed computing facilities has created an immediate need for two individuals with significant exploration experience. The ideal candidate will have experience in computer mapping, databases, or exploration modeling to analyze and process exploration requests. Some knowledge of FORTRAN or BASIC is helpful. One individual will work in San Francisco, the other in Houston.

Sohio is a leader in the oil industry. We offer attractive salary and benefits and an excellent working environment.

To apply, send your resume to Frank Wood, Sohio Petroleum Company, #94381, 100 Pine Street, San Francisco, CA 94111.

An equal opportunity employer, M/F/H/V.

SOHIO

MAINE

DATA BASE SPECIALIST — Strong IBM customer in Portland area will hire a tech support person to implement IDMS, interface with app. development and comp. operations people. $25,000-$30,000.

PROJECT MANAGER — A sophisticated 4341 shop in the country north of Portland. Prefer heavy background in sales and marketing applications. Must have good business sense and ability to deal with top level sales and marketing execs. To $35,000.

PROGRAMMERS AND ANALYSTS — Wide variety of opportunities in Maine and N.H. for DP professionals with a minimum of 2 years of COBOL exp. Competitive salaries, superior lifestyle.

Fee paid. Reply in confidence to:

ROGERS
AND SEYMOUR
PERSONNEL CONSULTANTS

94 Auburn St. • Portland, Me. 04103

SYSTEM PROGRAMMERS

Newell Companies is a leading manufacturer and merchandiser of consumer products for the do-it-yourself home improvement market. Newell is headquartered in Freeport, Illinois with manufacturing and distribution sites throughout the U.S. and Canada.

OPPORTUNITY — Ground floor development of an on-line environment. We have just installed a 4341 and are in the process of installing VM/CMS with CICS to follow.

EXPERIENCE — OS/VS1 or MVS sysgens, Assembler, Cobol, and SMP. IMS, VM/CMS and CICS are definite pluses.

COMPENSATION — Competitive salary with a comprehensive benefits package, relocation assistance program and a challenging future in a good working environment.

Call collect or send your current resume to:

newell
NEWELL COMPANIES, INC.

N.J. Connors
Newell Companies, Inc.
29 E. Stephenson St.
Freeport, IL — 61032
(815) 233-3141

Data Processing Professionals

Dallas and Houston Openings

Live in the fast-growing Southwest. Texas Instruments has immediate openings in Dallas and Houston where the costs of living are among the lowest in the country. You'll pay no state or city income taxes. And you can enjoy golf, tennis and sailing year-round.

We are seeking experienced professionals who thrive in or seek a challenging systems environment. These openings will involve you in the development of the next generation of interactive systems for worldwide business and scientific applications. Or you could become a member of a team supporting one of the largest networks of central and distributed computer centers in American industry.

All positions require an appropriate bachelor's degree. U.S. citizenship or permanent residency required.

Business Applications Programmer/Analysts

General Accounting, Financial Planning, and Personnel Systems

3 or more years' on-line applications development experience using COBOL in an IBM 370 OS or minicomputer environment required. DL/I or TI-990 experience helpful.

Manufacturing Systems

3 or more years' IBM DL/I data base development experience or minicomputer programming experience in PASCAL or FORTRAN required. Minicomputer programmers with TI-990 experience preferred.

Scientific Applications Programmer/Analysts

Computer Graphics, Mechanical Design, Factory Test, or Engineering Design Automation

Minimum of 3 years' experience in an IBM 370 OS or minicomputer environment required. TI-990 experience preferred. A degree in Mechanical Engineering, Electrical Engineering, or Physics desired. Interactive graphics experience helpful.

Engineering Information Systems

Minimum of 3 years' IBM DL/I experience required. Good oral and written communication skills a must.

Systems Software Programmer/Analysts and Systems Software Engineers

VTAM ACF/2

Minimum of 2 years' AFC/VTAM and 5 years' OS/MVS experience required. Experience defining, generating, monitoring, and tuning multiple-site VTAM/NCP networks a must.

Distributed Computing

Minimum of 3 years' minicomputer software design engineering, OS and communications support, and user consulting experience required. TI-990 experience preferred.

If you wish to work in this highly motivating and challenging environment, send your resume in complete confidence to:
Ed Haynes/P.O. Box 2103/Richardson, TX 75080.

TEXAS INSTRUMENTS
INCORPORATED

An equal opportunity employer M/F

Tangent INTERNATIONAL

NEW YORK CITY, DOMESTIC U.S.A. AND INTERNATIONAL OPPORTUNITIES

We have multiple openings for talented analysts and programmers. If you have at least four years experience and would like to join a fast track consulting firm with international opportunities, our specific requirements currently are:

New York City and International:	MARK IV any OP System
New York City:	OS, COBOL, CICS, DL/1, IMS

If you feel you qualify, submit your resume in confidence to:

TANGENT INTERNATIONAL
COMPUTER CONSULTANTS, INC.
SUITE 9807 1 WORLD TRADE CENTER
NEW YORK, N.Y. 10048
TELEPHONE: (212) 938-0438

Are you the top salesperson in your company?

If so, then you'll want to join one of the fastest growing software companies in the world!

We've increased sales 70% annually for the last 2 years and our customer base includes major corporations encompassing every imaginable industry!

We've defined state-of-the-art software through our products:

ADABAS - our award-winning DBMS for large mainframes

COM-PLETE - TP without complexity

NATURAL - instant online applications

ADABAS-M - DBMS for PDP-11s and VAX

THE DATA BASE MACHINE - the first commercially available backend processor

and we offer consulting and computer services, too.

We offer our sales representatives outstanding products to sell, a compensation plan geared to top performance, and a firm corporate commitment to provide outstanding technical support to our customers. As we grow, so does our product line - offering you the most challenging and rewarding sales position you've ever had.

We are looking for proven software sales experience in large scale IBM or DEC PDP/VAX environments. Experience with DBMS and TP desirable.

Positions open in most major U.S. cities.

Principals only, please send resume to:
Software AG of North America, Inc.
Personnel Department
11800 Sunrise Valley Drive, Suite 917
Reston, Virginia 22091

SOFTWARE AG
OF NORTH AMERICA, INC

Software AG is an equal opportunity employer.
All resumes are strictly confidential.

First Data: The "Last Word" in State-of-the-art Technology

and we'll give you $2,000 to prove it!

First Data Resources, Inc., a growing subsidiary of American express, enjoys leadership status in the credit card processing industry due to its advanced features and profit-generating, bottom-line results. With clients in a myriad of business and financial fields both domestically and internationally, our services are increasingly in demand.

This growing demand has created key positions for experienced professionals. And, we are so certain that you'll agree we offer some of the finest opportunities in the industry, we will give you a $2,000 employment bonus if you are hired for any of the following positions.

ON-LINE PROGRAMMERS

We're seeking professionals with 1-5 years experience using BAL in CICS/OS environment. Implement and maintain on-line operations software relating to general finance reporting. Exposure to large IBM compatible CPU's and peripherals a plus.

MVS SYSTEMS PROGRAMMERS

We're looking for individuals with experience in the generation and maintenance of MVS operating systems, JES2 or CICS for large IBM and AMDAHL CPU's. Experience should include SMP4, SCP problem determination, monitoring and tuning. Familiarity with maintenance and operation of ACF/VTAM and ACF/NCP are a plus, but not required.

APPLICATION PROGRAMMERS & PROGRAMMER ANALYSTS

A thorough knowledge of COBOL and 1-3 years experience is required. Exposure to BAL and OS preferred but not essential.

SYSTEMS ANALYST

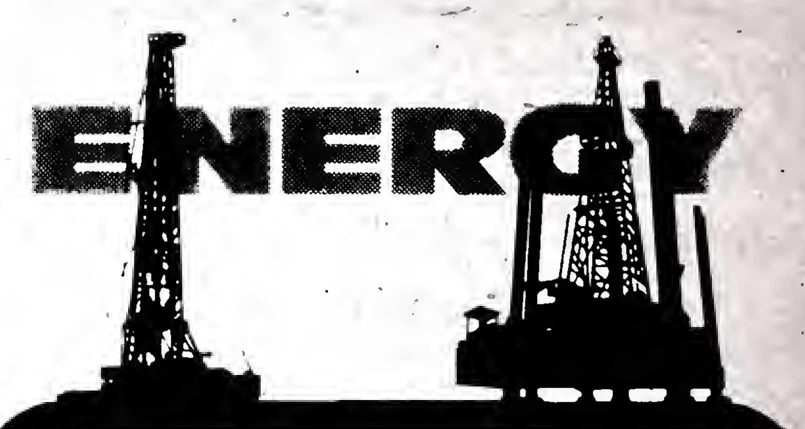
Motivated individuals with a minimum of 1 years experience and the capability of understanding the financial applications of our programming system are sought here. Familiarity with BAL and COBOL preferred. We'll train the right individual; however, exposure to OS and CICS is a definite plus.

These positions offer top salaries, benefits, and relocation allowances along with the opportunity to grow professionally in a dynamic environment, and grow personally in Omaha . . . one of the most progressive areas in the country. Qualified applicants can call Mr. John Mackey at (402) 399-3866 COLLECT, or send him your resume in complete confidence.

FIRST DATA RESOURCES, INC.

Box 102
7301 Pacific Street
Omaha, Nebraska 88114

An Equal Opportunity Employer M/F
No agency referred applicants accepted.



PROGRAMMER ANALYST

CORPORATE STAFF
San Antonio, Texas

Tesoro Petroleum Corporation is a growth-oriented multi-billion dollar corporation represented in 34 states and five foreign countries. Our operations include oil and gas exploration and production, refining, marketing, transportation, supplying oil field equipment and coal production. We are currently seeking a highly motivated Programmer Analyst.

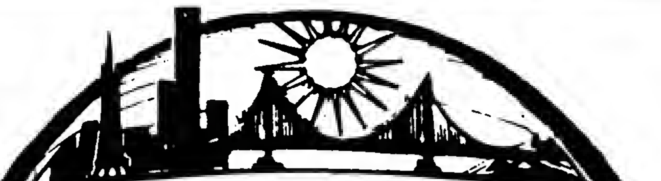
PROGRAMMER ANALYST: Responsibilities include analysis of well defined systems specifications and, under direct supervision, development of all levels of program logic flowcharts, evaluation and modification of existing programs, and preparation of operating instructions to guide computer operator during production operations. B.S. degree in Math, Business Administration, Computer Science or equivalent. Minimum of three years' COBOL programming experience.

TESORO

If you seek a company that recognizes personal achievement and offers excellent salary and benefits, send your resume in the strictest confidence to:

TESORO PETROLEUM CORPORATION
8700 Tesoro Drive
San Antonio, Texas 78286

An Equal Opportunity Employer M/F



In San Francisco It's Spring All Year Round

The EDP job market is booming in the Bay Area. At Logical Options we specialize in state-of-the-Art job placement at top Bay Area firms. We know who's offering the best technology, the best salary, and the best growth opportunity. At Logical Options we can facilitate your move to the Top Technology position that will give you the responsibility and recognition you deserve.

Call collect or send resume
Naturally we are employer retained.

LOGICAL OPTIONS INC

One Market Plaza, Spear Tower
Suite #2014 C
San Francisco, CA 94105
(415) 777-3900

DALLAS

PROGRAMMER ANALYST

Unique opportunity available for the individual who has demonstrated his ability to handle responsibility. Looking for a min. 2 yrs. DOS COBOL. CICS Highly desired. TO: $25,000

SYSTEMS ANALYST

Excellent growth opportunity. Shop doubling in size. Looking for 4 yrs. DOS or OS COBOL, developing financial applications. Desire CICS and PL-1. TO: $30,000.

PROGRAMMER

Have several positions available for individuals with at least 1 yr. COBOL and/or assembler programming skills. IBM, NCR, or DEC Systems bkgd. required. TO: $25,000.

CONTACT: **John Staiger**

ROBERT HALF
OF DALLAS, INC (214) 363-3300
Two NorthPark East Suite # 750
Dallas Texas 75231

DALLAS

AND THE SUNBELT

Our client companies have engaged to locate highly capable programmers, analysts, EDP Auditors, and Software Design Engineers for their current, urgent needs. Salaries range to mid 30's plus. Call collect today or send your resume to

FORTUNE

12860 Hillcrest, Ste. 123
Dallas TX 75230
214/661-2088
All Fees Paid

MOVE UP TO TUCSON

Apex Data Systems is a dynamic young company with our home office in Tucson Arizona. Apex sells complete data processing services (custom designed software, proprietary software, timesharing, and turnkey installations) primarily in the group insurance and accounting field. We require innovative people with proven records of achievement. Apex currently has openings for:

Marketing Director

Applicant should have a strong computer background, a bachelors degree, and 5+ years experience in marketing and sales. Insurance and business background a definite plus.

Applications Manager-Technical

Applicant should have a bachelors degree in MIS or Computer Science and 5+ years computer experience assisting programmers through analysts.

Applications Manager-Insurance

Applicant should have a background in group insurance sales and administration, a bachelors degree in MIS or Computer Science, and 5+ years computer industry experience.

Applicants for all positions should have proven management skills both with staff and a wide range of client personalities.

Send confidential resume to:

Dwight Babcock, President
Apex Data Systems
1161 El Dorado Place, Suite 100
Tucson, Arizona 85715

DATA PROCESSING PROFESSIONALS

Sr. Programmer Analysts
Systems Programmers
Account Representatives
Value Added Software Specialists
Programmer Analysts
Marketing Representatives
Technical Representatives
Operators

Nationwide Assignments Available Immediately

Major Firms Represented

Excellent salaries, benefits, stock options, relocation and many other considerations.

HRA

Contact Mr. Roger A. Goodwin
Human Resources Associates
P.O. Box 722
Denver, CO 80201
303/458-1756

EDP AUDITOR

Aggressive Palm Beach county bank is seeking an experienced specialist to audit its computer activities. Bank is over $300 million in assets and growing rapidly. Attractive salary and benefit package. Excellent opportunity for right person. Send resume along with your salary history to S.J.H. Audit Division, P.O. Box 1449, Lake Worth, FL 33460.

EOE, M/F

MANAGEMENT INFORMATION SYSTEMS SPECIALIST

A major transportation company with facilities in U.S. and abroad seeks Manager to head Management Information Systems function. Position offers high visibility and growth.

Application Requirements:

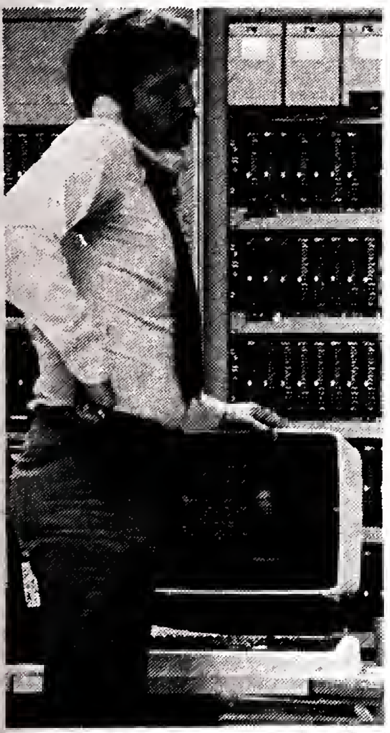
- B.S. in Computer Science
- Minimum 6 years in EDP
- Managerial experience in System Analysis and Development
- Evaluation of computer hardware, software, telecommunication
- Background in Logistics/Physical Distribution Systems
- Knowledge of Transportation Industry
- Good managerial skills
- Must have high level communications skills

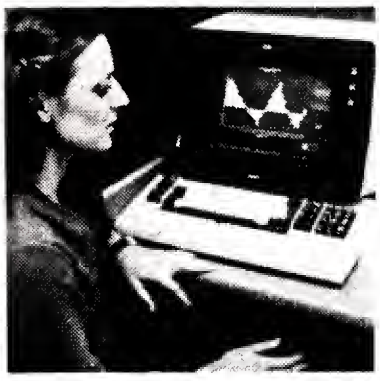
Remuneration commensurate with experience. Excellent benefits. Position located in Baltimore. Apply in confidence stating salary history and requirements to:

Vinnell Transportation Center
131 E. Redwood St.
Baltimore, Maryland 21202

COMPUTER PROFESSIONALS

We developed our interactive, real-time worldwide system ourselves. And that's just one good reason to join Emery!





Emery Air Freight is the world's largest air-freight forwarder for many good reasons. One of the biggest is our computer system. In fact, our system is so sophisticated, it gives us capabilities that far exceed much of our competition.

Because of our dynamic business growth, we are experiencing dynamic systems growth.

Emery needs people. Good ones. Now.

These are outstanding growth opportunities at our international DP center in Wilton, Connecticut for individuals capable of taking the lead and innovating. Individuals who aren't afraid of a challenge. Individuals like you.

APPLICATIONS PROGRAMMER/ANALYSTS

MINIMUM 2 YEARS PROGRAMMING EXPERIENCE

Financial·Enhance and develop customer and management information systems, including business graphics.

Rating and Billing·Online rating; batch process billing of over $2 million in shipments daily.

Tracking and Tracing·Enhance and upgrade worldwide real-time system. Experience with direct access files desirable.

SOFTWARE PROGRAMMERS

General software and systems support. Requires 2 years programming experience in BAL.

DATA PROCESSING SUPERVISORS

Systems and Applications·Control one or more concurrent projects. Requires minimum 5 years programming experience (2 years as a supervisor in COBOL and/or BAL environment).

Emery's concern with achievement and excellence is evidenced by our policy of competitive salaries and liberal benefits including full relocation assistance.

SENIOR SYSTEMS ANALYSTS

Evaluate major user needs through feasibility studies and research of existing systems. Define project, then review progress periodically. Requires experience with large-scale IBM environment; minimum 5 years data processing experience (3 years in systems analysis).

It is important to affiliate with a company that holds data processing in high regard. A company that supports hardware expenditure. A company that knows how much data processing success ensures corporate success. A company whose data processing growth and development is truly explosive.

Our Hardware
- ☐ Twin IBM 370/158-3 equivalent
- ☐ IBM Color Graphics
- ☐ IBM Series/1
- ☐ IBM System 7
- ☐ Individual programmer terminals VM/CMS)

Our Software
- ☐ CCAP-on-line operating system, enhanced and maintained internally
- ☐ DOS/VS
- ☐ VM/CMS
- ☐ OS (MVS/SNA)-Lab environment

Call us to speak with one of our Computer Professionals.
In Washington Call: (202) 289-8281
In Boston Call: (617) 536-8988
In Connecticut (and all other states) Call: (203) 834-3201.
Or send your resume or a letter with salary requirements
to: Emery Air Freight, Employment Department CW,
Wilton, CT 06897. We'll respond quickly.

EMERY
Air Freight
An equal opportunity employer

Indiana University
Invites Applications for
Manager of Systems Development
Administrative Computing

Job Description: We're looking for an experienced professional to take charge of a team of analyst/programmers engaged in the design, development, implementation, and maintenance of administrative systems for a major university with eight regional campuses. Responsibilities include providing technical leadership, establishing priorities, preparing time and cost estimates for proposals, monitoring and reporting team progress, and coordinating with users and operations staff during all project phases. We are currently operating an 8-MEG IBM 370/168 computer and a network of 280 interactive terminals. We are developing a multihost distributed processing network for more effective administrative service.

Qualifications: A baccalaureate degree and five years of analysis and programming are required. Experience with structured systems design and advanced COBOL concepts is expected. In addition, experience with on-line systems, data base management systems, and VSAM file structures is desirable. Supervisory training would be helpful.

Procedure: We offer a competitive salary commensurate with qualifications and experience. If you have demonstrated experience in these areas and want an opportunity to make a significant professional contribution, send your resume and salary history in confidence at the earliest possible date to: **Mr. Richard Macek, Department of Personnel, 201 N. Indiana, Indiana University, Bloomington, Indiana 47405.**

DATA PROCESSING PROFESSIONALS

DATA RESOURCE CORPORATION, headquartered in Atlanta, is a leader in quality Contract Programming and Consulting. Our continued growth in the Southeast and Southwest has created opportunities for versatile Professionals with state-of-the-art skills in Programming and Systems Design.

We are currently seeking individuals with at least 3 years of diversified programming experience, strong technical backgrounds, and who possess the desire to work in various, stimulating Data Processing environments. IMS and CICS skills are of special interest, as are the abilities to travel or relocate.

We can offer you competitive salaries and comprehensive benefits programs, including bonuses and profit sharing. If you've been searching for a growth opportunity with a dynamic and progressive company with a Management team that "puts people first," the DRC is your answer.

For immediate consideration, please call BECKY FINLEY or MICHAEL HARRIS COLLECT at (404) 633-9387, or send your resume to:

DATA RESOURCE
CORPORATION
1649 Tullie Circle N.E.
Suite 110
Atlanta, GA 30329

An Equal Opportunity Employer M/F

MELLONICS

Knows Where They're Going Want To Come along?

Mellonics is a major computer services company, located in the beautiful San Fernando Valley, just 27 miles from Los Angeles. We enjoy a growing national reputation for delivering cost effective data processing services to customers in all facets of the country's business community. We have built this reputation by maintaining the very latest equipment and creating an environment where people like you can continue to advance the state-of-the-art. We are dedicated to being the very best, and if you would like to come along, stop in or call us today!

DATA SYSTEMS ANALYST

- Business Applications
- Batch and on-line projects

DATA BASE SUPPORT SPECIALIST

- IMS data base and application
- CICS application development

TECHNICAL SUPPORT ANALYST

- Software evaluation
- Application design support

For immediate consideration
send resume or call COLLECT
Donna Turner
(213) 887-5039

Litton
MELLONICS
INFORMATION CENTER
6701 Variel Avenue
Canoga Park, CA. 91703
Equal Opportunity Employer M/F

MELLONICS

SYSTEMS ANALYST

Salary — $22,500 per year, 40 hour week. Customer support for users of Data Base Systems. Testing of company's system software, including debugging of applications software and verification of system documentation. Requires a Master's Degree in Information Systems. No experience necessary. **Apply to Mr. Christopher Barry, President, Micro Data Base Systems, Inc., P.O. Box 248, Lafayette, Ind. 47902.**

Sr. Programmer Analyst
City of Santa Ana, CA
Population 205,000
Salary $1883-$2288/month

Requires two years of college with course work in data processing and extensive experience in EDP including at least three years at the programmer analyst level with experience in the use of COBOL. Apply by **4-30-81 at Personnel Dept., 20 Civic Center Plaza, Santa Ana, CA 92701. 714/834-4154.**

AA/EOE

SYSTEMS DESIGNER

Outstanding RI seacoast co. seeks sr. analyst w/ strong sys. devel. exp. Fin'l. apps. bkgrd. req. Involved w/ complex sys. requirement definitions. Project leadership respon. Salary $27,000 range (Fee paid). Contact Bob Lathrop.

Robert Half of
Providence, Inc.
400 Turks Head Bldg.
Providence, RI 02903
(401) 274-8700
Personnel Consultents

Data Communications Networking Architect

Get in on the launching of a major data communications project.

NCR is the leader in the manufacture of POS systems, including those used in scanning applications.

We connect retail in-store processing systems with data processing centers in the food distribution industry. We are establishing compatibility of retail data communications with the industry's evolving Universai Communications Standard (UCS).

Working with development and systems engineers, you will formulate the conceptual design and system architecture to provide the necessary interconnectability. As the architect of the system, you will be recognized for your key role in its accomplishment.

Your qualifications should include in-depth experience in protocol/access methods, general routing, packet/message switching, and network configuration — along with the ability to communicate effectively orally and in writing.

You will be located in NCR's newest engineering and manufacturing facility in Easley/Greenville, South Carolina, in the rolling foothills of the Blue Ridge Mountains. We enjoy a termperate climate that makes our tennis, golf, camping and boating seasons long ones. Atlanta, Charleston, Myrtle Beach, and Hilton Head Island are within easy driving distance.

For prompt consideration, call or send your resume to: **Shirley A. Rowland, (803) 855-1980, NCR Corporation, Dept. 1200 Greenville Road, Easley, SC 29640.**

NCR

Complete Computer Systems

An equal opportunity employer

WAITING FOR YOUR SHIP TO COME IN? LOOK FOR IT ON THE SAN FRANCISCO HORIZON!

There are over 600 openings in our data bank for the San Francisco Bay Area alone. If you're interested in one of them, nobody can give you more help than we can. Here are some of the things you should consider.

You need somebody who's been on the scene for a long time and knows the market inside and out. We've been intimately involved in EDP placements for over 10 years.

You want somebody with good connections. Our stable of client companies numbers over 150, including the most prestigious in the Bay Area.

You should be dealing with an organization that keeps its ear to the ground and hears of every possible opportunity. Our staff of nine industry-wise recruiters has ferreted out more than 600 current openings, and is able to give you the widest possible choice of positions.

Opportunities are also available in other cities, through our 25 affiliate firms. OUR CLIENT COMPANIES PAY ALL FEES, INTERVIEW, AND RELOCATION EXPENSES. Send us your resume today or call collect, Computer Resources Group, Inc., 303 Sacramento Street, San Francisco, CA 94111, (415) 398-3535, or 3333 Bowers Avenue, Suite 130, Santa Clara, CA 95051, (408) 727-1658.

For May 6, 7, or 8 NCC Appts., contact Larry Goldfarb at our S.F. office or call him at 312-836-0100 in Chicago, The Marriott Hotel, 540 N. Michigan Ave.

COMPUTER RESOURCES GROUP INC.

National Computer Associates

An employer-retained professional placement service

Exeter Associates

NATIONAL RECRUITING CONSULTANTS

BRUCE A. MONTVILLE
MANAGING PARTNER
(603) 926-6712

PROJECT SUPERVISOR INTERNATIONAL DIVISION

$34,000 — $38,000

THE CLIENT: Leading Fortune 500 Corporation with multiple international manufacturing locations is seeking to establish administrative and financial control systems via computer applications at their headquarter location in New England. Excellent promotional opportunity and fringe benefits.

THE POSITION: The successful candidate will plan and lead a group of 6 Sr. Programmer/Analysts in applications definition, systems development to final design and programming and future planning. Position reports to International Systems Manager.

QUALIFICATIONS: Prior experience in project planning and execution mixed with heavy user interface will be an asset. Exposure to the latest IBM distributed data processing techniques will be useful as our client's resources include large scale mainframes on-line to clusters of minis. Financial applications experience is required.

For prompt and confidential consideration, forward your resume to DAVID PEPIN or call him TOLL FREE.

(800) 258-7328

P.O. BOX 623, COMPUTER PARK, HAMPTON, N.H. 03842
A COMPONENT OF EXETER INTERNATIONAL, INC

ELECTRIC UTILITY

Generation and transmission utility located on Colorado's beautiful Western Slope, currently employing over 900 people, has openings for:

SOFTWARE SPECIALIST

Real time Systems Programmer for Harris 7500 SCADA/AGC system. Requires proficiency in Fortran and Assembly language programming with 5 years experience in real time data acquisition and telemetry systems software. Degree in computer science desirable.

ELECTRONICS SPECIALIST

Training plus experience in maintenance of electronic and electrical control equipment including microwave, UHF 2-way radio, frequency division mux, computer directed data systems (SCADA, CBX, SECURITY)

We offer excellent benefits and promotional possibilities. Salaries commensurate with education and experience. Please send resume to:

Dept. JVJ
Colorado - Ute.
Electric Assn., Inc.
P.O. Box 1149
Montrose, Colo. 81402

An Equal Opportunity
Employer M/F/V/H

MANAGER OF TECHNICAL SERVICES COMPUTER SERVICES CLEVELAND STATE UNIVERSITY

A single integrated center meets the institutional, research, and administrative computing needs of CSU. The University Computer Services Department maintains an IBM 370/158 operating under VS1, and IBM 4341 operating under VM, and a network of distributed processors. Teleprocessing facilities are supported by CICS and CMS. An extensive telecommunications network is maintained by a 3705 controller accessing RJE's and distributed processors.

The Manager of Technical Services will be responsible for participating in hardware and internal software review and selection; operating systems support; telecommunications networking and capacity planning; throughput optimization; software application package and new operational system proposal reviews for compatibility and capacity requirements; provide technical consultation for all sectors of Computer Services and supervision of the Technical Support group.

Requirements: bachelor's degree and 2 yrs experience or 5 yrs experience in a technical support function, extensive knowledge of medium to large scale hardware configurations and associated operating system software. Knowledge of OS/VS1, CICS, VM, CMS is a prerequisite.

Starting date May 18, 1981. Salary commensurate with knowledge and experience. Send resume including salary history by May 11 to: **Mr. Terry Tucker, Asst. Director for Operations and Technical Support, Computer Services, Cleveland State University, 1983 E. 24th St., Cleveland, Ohio 44115.**

Equal Opportunity Employer M/F/H.

F-O-R-T-U-N-E

If you are SERIOUS about career development and you want and demand CHALLENGES with projects that are SIGNIFICANT and ones you can IDENTIFY with, then you must avail yourself of these outstanding opportunities.

NO ONE KNOWS THAT MARKET LIKE WE DO.

Right now, we have over 2,500 jobs in our nationwide network. Get your personal 50 page listing of over 500 of the most urgent of these jobs - with salaries ranging from $18-60,000.

FOR IMMEDIATE RESPONSE, CALL COLLECT
(408) 298-8011

Look for our response card in CW Spring Mailing

F-O-R-T-U-N-E Personnel of San Jose
1602 The Alameda, Suite 104
San Jose, California 95126

Mid-Ohio Company has opening for Computer Programmer/Systems Analyst. Duties: Analysis, design and implementation of data processing systems. Required: MS degree Computer science, knowledge of RPG II, CICS, DOS/VSE and VSAM Salary $18,000/year, 40 hrs/-week. Send resume to **Clearance Representative, Ohio Bureau of Employment Service, PO Box 16531, Columbus, Ohio 43216.**

Pacific Northwest

Washington · Oregon · Idaho & Alaska

PROGRAMMERS · ANALYSTS · AUDITORS

THE NORTHWEST LIFESTYLE SPANS ALL SEASONS. Do you plan to visit or relocate here? If you have business applications experience, we can arrange interviews for you. Call us collect or send your resume and itinerary and we will go to work fast. ALL FEES PAID BY EMPLOYERS

ROBERT HALF
PLACEMENT SPECIALISTS

Seattle, WA · Ray Magill · (206) 624-9000 · 1301 5th Ave., Suite 2626 · 98101
Portland, OR · Bob Clawson · (503) 222-9778 · One S.W. Columbia, Suite 650 · 97258

EDP OPPORTUNITIES

PROJ.MGR lab-auto, mini/micro	$35K
MGR.Systems MRP shop flr,sys dev.	$45K
MGR.Auto Tala Machs-3614,I.C.C.F. COLTS	$43K
S/A on-lina TANDEM,lg main	$35K
MGR Software data/comm DOS VSE NCP VTAM	$42K
PROG/ANALYST IMS,COBOL, Invastmts	$35K+
I.M.S.Soft.HIDAM HISAM perf tuning	$39K+
CAPACITY Planning MVS,SNP IBM&mini	$39K+
TELECOMM 3705,VTAM,ACF	$35K+
SYS ENG CHIPS-SWIFT FX	$37K+
MGR D/B VTAM,CICS,CMS,3032	$40K
CONSULTANT,software MVS,VS, per tune,trvl	$37K+

Call Bill Borrelli (212)349-3610

WM.HARRIS ASSOC.

150 Broadway agency NY, NY 10038

MIS DIRECTOR

Directs and coordinates planning and production activities of a joint computer center. Supervises data processing personnel and serves as chairman of City/-County Data Processing Steering Committee. Requires bachelor's degree in computer science or closely-related field and five years experience in data processing, management and systems analysis, or any equivalent combination of education and experience. Salary negotiable with excellent benefits. **Apply to Personnel Office, City of Grand Junction, 250 North 5th Street, Grand Junction, CO 81501, by May 1, 1981.** EOE.

International Opportunity for Computer Operators and Programmers

Halaby International Corp., a Conn. based company with a successful and expanding operation in Saudi Arabia has immediate raquiramants for computer operators and programmers with 1-2 yrs. experience. Preference given to ENVIRON 1, TOTAL, 370 OS axparienca. Minimum ona year assignmant with option to ranew.

Wa offar a uniqua living axparience in a dynamic environmant, challanging work, and an axcallant opportunity to davalop your skills. Package includas U.S. compatitiva base pay; genarous overseas allowanca; year end bonus; cost of living allowance; transportation allowance; full tax relief; R&R trips at company expense; free life/medical insurance; and access to our recreational facilities on the Red Sea.

Send resume to
Halaby International Corp.
239 Glenville Rd.
Greenwich, CT 06830

Programmer/Analyst: Adrian College seeks a person to develop software and manage computing services for academic/administrative users. Must design, implement softwara; coordinate development of management informaiton system; and implement future computer applications. DEC PDP 11/34 with RSTS/E. Applications in BASIC, RSTS experience, knowledge of systems analysis and instructional computing ara important qualifications. Bachelor's degree, communication skills essential. experienca at four-year college, advanced degree, computer teaching experience and prior work with DEC systems desirable. Adrian is a growing liberal arts college, 45 minutes from Ann Arbor, 60 minutes from Toledo, 75 minutes from detroit. Enrollment has grown from 800 to 110 in two years; further growth planned. Starting date June 1, 1981. Salary competitive, commensurate with qualifications/experience. Send letters of application and nominations with vitae immediately to: Thomas E. Williams, Associate to the Vice President for Academic Affairs, Adrian College, Adrian, Michigan 49221. Women and members of minority groups are encouraged to apply.

Submarine Signal

SOFTWARE

Sr. Engineers

Translate systems requirements into software architecture, and direct a team of software engineers through the implementation of this system to delivery. This involves Fire Control Systems applications including reliability, error reporting, display graphics, target geometry. High order and assembly languages required.

Methods Engineers

Extend our integrated software development environment (PDP-11 and VAX-11-780 with interactive time sharing system) in the areas of program requirements and design languages, software tools and target interfaces. We seek individuals with all levels of experience, plus formal training in languages/compiler development, Ada, simulation and modeling.

SYSTEMS

Sonar

Comprehensive sonar systems involvement, with substantial customer contact. Total sonar systems design experience is required, with in-depth knowledge of signal processing hardware and/or software systems design procedures.

Systems Analysis

Apply scientific computers to modeling simulations and analyses. Experience solving practical physical problems through applying analysis/simulation techniques.

Fire Control

Analyze, design and specify advanced functional level systems. You should have Fire Control Systems knowledge (MK 113/10, MK 117, MK 118) and experience with the implementation on AN/UYK-7 based combat systems.

Surface ASW

Translate our customer requirements into a comprehensive system architecture, and define critical items for development.

Systems Analysis

Experience in applying estimation theory to Kalman Filtering and other estimation problems in applied environment.

Command/Control

For both submarine and surface applications, develop command and control systems for tactical employment, display communications, navigations, sensor and weapons systems.

Two-Thirds of the World is Ours.

Raytheon Submarine Signal Division is the leader in undersea technology. Everything from ASW and sonar technologies, to small water resource studies, and major hardware and software systems design.

With a world this large, there's no room for boredom. Our flexibility gives you the challenge of exploring any aspect of our technology you're ready for. Our steady growth, world-calibre staff and enviable R&D commitment assure you of bright prospects for the future.

If you have the talent we're looking for, come join us at Raytheon Submarine Signal Division. Because you've only seen the edge of our world.

If you possess a minimum BS and 5 years experience, send your resume and salary history to: Manager of Professional Employment, (Dept. CW-3), Raytheon Company, P.O. Box 360, Portsmouth, RI 02871.

Submarine Signal will be conducting interviews on Long Island April 28 & 29. If these dates are convenient, call our Manager of Professional Employment COLLECT at (401) 849-3010 to arrange an appointment.

RAYTHEON

RAYTHEON COMPANY
SUBMARINE SIGNAL DIVISION

An Equal Opportunity Employer

Manager of Systems and Programming

Position requires a Bachelor's degree. Graduate education is desirable. Eight to ten years in data processing with demonstrated project management responsibility in a variety of applications area.

Plans and administers a staff of qualified analysts and programmers. Will oversee large scale projects for development of major modification of informaiton systems from concept to full operation. Knowledge of ANSI COBOL, DOS/VSE, CICS, DMS, DL-1.

Excellent salary and benefits with a progressive coal company in Eastern Utah.

Please send resume in confidence to:

Personnel Director
EMERY MINING CORP.
Box 310
Huntington, Utah 84528

All replies will be answered.

An Equal Opportunity Employer

SYSTEMS ANALYST

Large mfg firm seeks indi with COBOL on a 360/OS MVS/JES II using HASP applications. Mfg a must, MRP a plus. Excel Ben. $24K.

ROBERT HALF
OF OKLAHOMA
5840 S. Memorial Drive, Ste. 217
Tulsa, Oklahoma 74145
(918) 627-1600

COORDINATOR OF COMPUTER SERVICES

Oualifications: master's degrea (or the aquivalent) with coursa work in computar science, systems analysis and systems programming. Experianca in COBOL and BAL with knowladga of BASIC. Experianca in educational systams and undarstanding of computer managament of student records. Salary: $31,168-$39,128. Libaral benafits. Send letter of application cradantials and transcripts to:

Evanston Township High Shcool
1600 Dodga Avenua
Evanston, IL 60204

An Equal Opportunity Employer

TIRED OF BUGS?

Bugs can take All the Fun Out of Programming. Become an Expert Programmer. Learn the Secrets of Practical COBOL Programming. It's an Easy to Read Guide. You Can Find Out How To:

- *Read COBOL Manuals
- *Write Structured Code
- *Debug COBOL Programs
- *Use Video Screen FORMS
- *Interface with DBMS
- *Understand Data Dictionary
- *Develop HIPO Flowcharts
- *Buy a Computer

And much more!! Practical COBOL Programming costs $12.95. Plus $1.00 for postage and handling. Mass. residents add 65¢ sales tax. Send your Name, Address and check or money order To:

Prac.ical COBOL Programming
Squire, Buresh Associates, Inc.
Dept. CW-4/81 P.O. Box 2029
Worcester, MA 01613

Money Back Guarantee. Allow 6 to 8 weeks for delivery.

• ORDER TODAY •

© 1981 Squire, Buresh Associates, Inc.

REALTIME MINI/MICRO SYSTEMS

Lundy Electronics is an innovator in the fields of OCR, MICR, and special purpose terminals. We provide complete system solutions to unique problems. Expansion and acquisition have created the following ground floor opportunities for software professionals.

SYSTEMS ANALYST-COMMUNICATIONS

Be responsible for the implementation of protocols and establishment of private communications networks. Must have good theoretical understanding of networking plus actual implementation experience with 3270 and/or SDLC. Degree required plus at least 4 years assembly language experience, preferably Intel 8080.

SENIOR PROGRAMMER-CAD/CAM

Develop a CAD/CAM package to take advantage of the exceptional capabilities of our high performance random scan graphics terminal. Must have technical degree and at least 2 years experience in the development of CAD/CAM systems on minicomputers. Experience with CORE or IGES standards, AD 2000, CADAM, CADD or solid geometry packages would be helpful.

We offer excellent salaries, unlimited growth potential, and above all the opportunity to work on challenging tasks with some of the best people in the business.

Send resume and salary requirements to: Miss Ethel Aiken

LUNDY ELECTRONICS & SYSTEMS, INC.
Glen Head, NY 11545
An Equal Opportunity Employer M/F

IN TODAY'S ECONOMY THE "SUNBELT" IS THE BEST PLACE TO ADVANCE YOUR CAREER!!!

Our internationally recognized client/family is currently seeking career-motivated individuals throughout the beautiful Sunbelt.

DIGITAL DESIGN

BS/MSEE with 2-10 years experience in high-speed logic design (TTL, L/S, S) and a working knowledge of microprocessors, including Software.

ANALOG DESIGN

BS/MSEE with experience in the design of HF(GHz Range) transmitter and receiver circuitry for satellite communications.

Salary and benefits programs are competitively structured to compliment an easy lifestyle, in addition to a professional work environment that offers challenge and reward. Please forward your resume, in confidence, including salary history, or call:

(813) 872-1853
FRANK LEONARD PERSONNEL
1211 N. Westshore Blvd.
Tampa, Florida 33607

An Equal Opportunity Employer M/F. Client Company Pays All fees

Member

FLORIDA
MAS MANAGER

Are you ready for greater responsibility? A national C.P.A. firm is seeking a self-starter with extensive EOP knowledge and marketing skills to head up its MAS department. This individual preferably should have had prior work experience with a large C.P.A. firm. C.P.A. certificate is a plus. This is a real opportunity for the no. 2 person who is ready to be no. 1! Outstanding fringes. Fee paid.

Salary to $40,000

Chuck Neil
Bonnie Goux

ROBERT HALF
OF MIAMI, INC.
1395 N.W. 167th Street
Suite 100
Miami, FL 33169
(305) 625-5433

COMPUTER SCIENCE FACULTY POSITION

An opportunity to have an impact on developing field of Computer Science at a liberal arts college. Westminster seeks a C.S. faculty member to teach introductory/advanced courses and serve as C.S. major advisor. College stresses excellence in teaching; small student-faculty ratio. Normal teaching load, 12 hours per semester. Masters in C.S. required. Rank/salary open, depending on qualifications. Contact: **John Schultz, Assistant Dean, Westminster College, Fulton, MO 65251. AA/EOE.**

PROGRAMMERS & SYSTEMS ANALYSTS

Major publishing company with divisional headquarters in Northeastern Minnesota is expanding its programming and systems staff to support dynamic growth and expansion.

We are seeking experienced programmers and systems analysts who will be responsible to management for the design, programming and implementation of new and existing data processing systems.

Located in scenic Duluth, MN, our port city offers excellent recreational, educational and cultural opportunities. Salary open. These are career opportunities with excellent benefits and growth potential. Please send resume including salary history to:

Personnel Manager
HBJ Publications
1 East First St.
Duluth, MN 55802
Equal Opportunity Employer

DEBUG your job search with POSITIONS WANTED.

Software Programming Positions

As a software programmer/analyst at Anheuser-Busch, you will have an opportunity to participate in the installation, maintenance, tuning and performance management of state-of-the-art systems software; MVS/SP, JES2, TSO, CICS, ACF/NCP, ACF/VTAM, shared DASD plus selected vendor program products.

Our environment consists of dual IBM 3033's and an IBM 158/AP. This system supports a national network of 275 + display stations and printers online to CICS and 18 IBM System/34 and RJE terminals.

We offer an excellent salary and benefits package as well as the advancement potential you would expect from America's leading brewer. To apply, send your resume, including salary history, in confidence to: ANHEUSER-BUSCH COMPANIES; Corporate Employment; Department G-5-SP-CW; 721 Pestalozzi; St. Louis, Missouri 63118. An Equal Opportunity Employer M/F.

ANHEUSER-BUSCH COMPANIES

SALES ENGINEERS

If you have a degree with 3 to 5 years air conditioning or computer sales experience, we may have just the opportunity you have been looking for. We are a world leader in the computer room air conditioning and power systems industry. Our outstanding growth requires the addition of experienced personnel to support our sales team. These are high visibility positions that require 25 percent travel and are headquartered in Columbus, Ohio.

We are a unique company that offers an unparalleled opportunity to an individual who enjoys a demanding work schedule, professional growth and seeks a challenging career position. We offer excellent salary & commission plan plus an outstanding benefits package (including relocation expenses).

If you qualify, please send resume with salary requirements to:

Liebert Corporation

PERSONNEL DIRECTOR
LIEBERT CORPORATION
P.O. BOX 29186
COLUMBUS, OHIO 43229

Just to remind you!

Our National Computer Conference issues are coming up. The show issue appears May 4, 1981. Advertising space is on a first come, first serve basis, so reserve early.

Here's a list of the issues:

NCC Show Issue — May 4, 1981.
Early black and white deadline is April 23, 1981.

NCC Wrap-Up Issue — May 11, 1981
Black and white deadline is May 1, 1981.

For further information call or write:
Computerworld
375 Cochituate Rd.
Framingham, MA 01701
617-879-0700, 800-343-6474

Looking forward to seeing you in print!

ASSEMBLY LANGUAGE PROGRAMMERS

San Francisco Bay Area

Varian Instrument Group is a leading manufacturer of scientific instruments and data handling devices for chemical instrumentation. Our growing Walnut Creek division is conveniently located in the San Francisco East Bay area, just a few minutes from downtown San Francisco.

Our expanding software development department has immediate openings for Programmers to participate in the development of microprocessor-based products. Minimum 2 years assembly language programming experience on Z80 or 8080 CPU's. Prefer degree in computer science or related field with some chemistry. Real Time operating systems experience desirable.

We offer excellent fringe benefits including 100% tuition refund for job related studies, health and dental insurance plans for employees and dependents. For confidential consideration please send your resume, including salary history and requirements to: Professional Employment, 2700 Mitchell Drive, Walnut Creek, CA 94598. An equal opportunity employer f/m/h/v.

VARIAN
Instrument Group

PROGRAMMER ANALYST

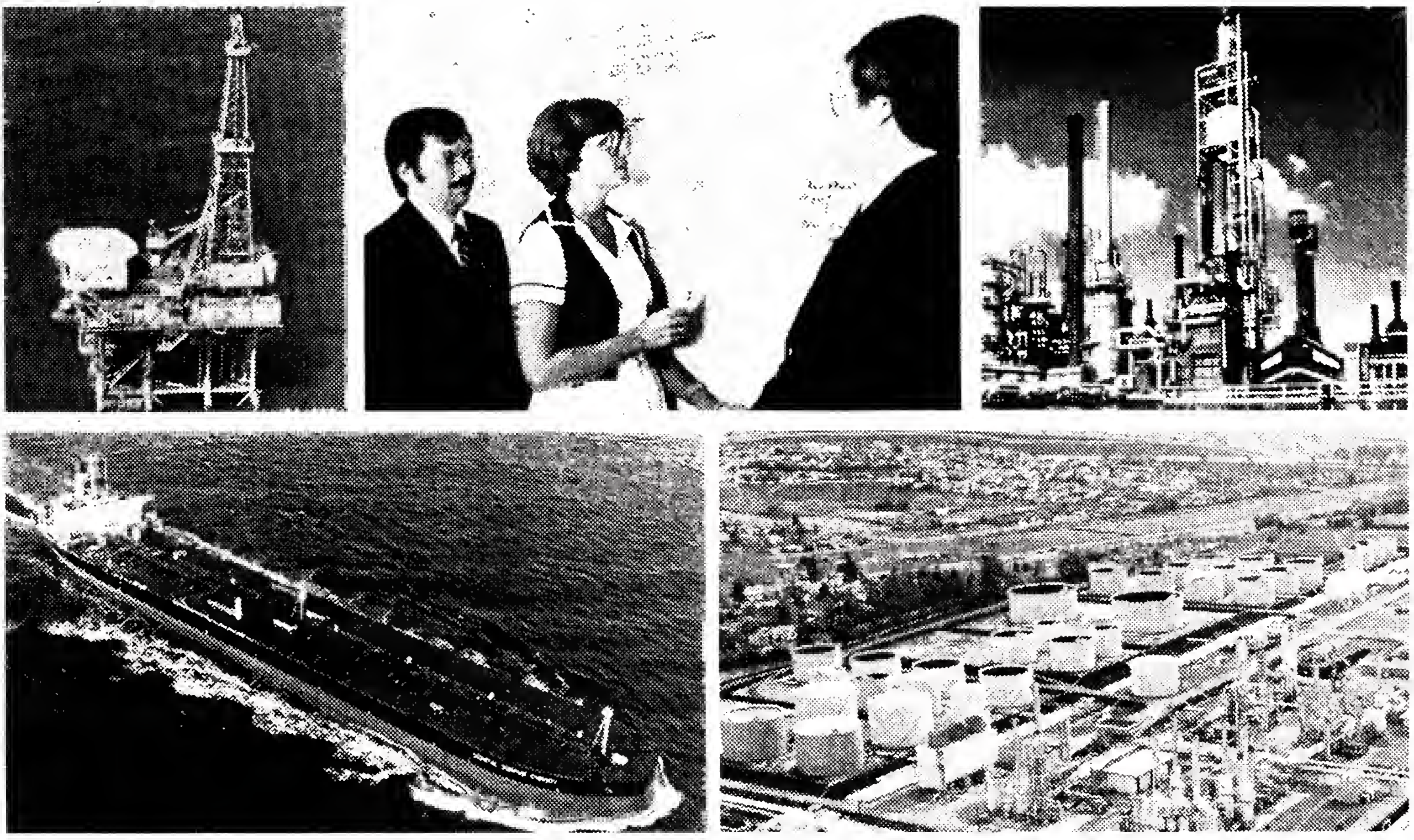
RPG II/COBOL Programmer with 1-2 years experience for large distributor in Meadowlands, N.J., Bergen County area. Hewlett-Packard experience preferred but not necessary. Salary open. Full benefits. Call 201/933-9100, x227.

DATA PROCESSING INSTRUCTOR

B.A. required, M.A. preferred. Minimum 18 semester hours or equivalent in courses in programming languages, analysis, design and computer operations. Teaching experience required, preferably D.P. Have strong programming experience in COBOL, familiar with RPG, FORTRAN or BASIC. $10,000 — $18,360. Apply by May 15th. Write to Director of Personnel, Polk Community College, 999 Ave. H, N.E., Box C, Winter Haven, FL 33880. Phone: 813/294-7771, Ext. 310

EOE

BUSINESS & TECHNICAL SYSTEMS OPPORTUNITIES



The Coastal Corporation is a broadly based, 5.1 billion dollar energy supply company operating worldwide. A position with our organization is always a challenge due to the extensive amount of responsibility that goes along with it. This philosophy combined with our outstanding growth record and the desirability of our locations should make the following opportunities extremely attractive to you.

BUSINESS SYSTEMS
(Houston)

Sr. Analysts & Project Leaders: Requires degree and a minimum of 6 years experience in definition, design, development and implementation of major EDP business systems (COBOL) in a large-scale IBM environment. Openings exist in the areas of FINANCIAL, CORPORATE (WANG Payroll), OIL & GAS, AND PRODUCT SYSTEMS.

Computer Data Security Administrator: Experience using ACF2 Security Software package a must.

TECHNICAL SYSTEMS **(Houston, Corpus Christi, Colorado Springs)**

These positions require 2-6 years experience.

Systems Software Analysts: Requires a degree and experience on CICS and/or MVS systems.

Computer Process Control Engineer: Requires degree in Chemical or Electrical Engineering, Computer Science or Math and in-plant operations or process control engineering experience.

The Coastal Corporation provides highly competitive salaries, benefits and a generous relocation package. If unable to call, please forward your resume and salary history to: Dept. CW-420, The Coastal Corporation, Nine Greenway Plaza, Houston, Texas 77046. An equal opportunity employer, m/f.

DETROIT INTERVIEWS
April 27 & 28
PHILADELPHIA INTERVIEWS
May 4 & 5
To set up your interview, call
(713) 877-6980 COLLECT

The Coastal Corporation

HOUSTON

CAREER GROWTH OPPORTUNITIES!!!

We specialize in understanding your requirements. Our staff has nearly 35 years DP experience from Operations thru MIS Director. The following expertise turns Houston companies on:

IMS — CICS — OS/MVS — DOS/VSE — ADF —
VTAM/VSAM — BAL — COBOL — PL/1 —
Structured design/programming.

PROGRAMMERS	$15-20,000
PROGRAMMER/ANALYST	$18-24,000
SR. PROG/ANALYST	$20-26,000
SYSTEMS ANALYST	$25-30,000
SR. SYS ANALYST	$28-32,000
PROJECT LEADER	$30-35,000
SYSTEMS PROGRAMMER	$26-35,000
D.B. ANALYSTS	$28-34,000

Plus other more technical positions.

Interview, Relocation and Fee all company paid

CALL JIM FLEMING AT 713-688-1800 TODAY!

ROBERT HALF
OF HOUSTON, INC.
720 N. Post Oak Rd. - Suite 228
Houston, TX 77024

DATA PROCESSING MANAGER

Large Florida Daily newspaper is seeking a person with strong communication and management skills to oversee and supervise the complete production/business data processing function including system design, programming and operations. Newspaper background preferred. Broad background in technical aspects helpful. Experience with ATEX and DEC hardware desirable. Join one of Florida's fastest growing publishing operations. We provide an excellent benefit package, salary commensurate with background and experience. Send resume with salary history to:

C.W. Box 2544
375 Cochituate Rd. Box 880
Framingham, MA 01701

Computer Faculty

Search extended Assistant/Associate/Full Professor. Earned Doctorate in Computer Science preferred. Candidates must demonstrate professional competency through industrial experience, consulting, research and teaching. Background in database design, systems analysis, programming languages, operating systems (real-time) and software technology required. Salary is competitive. Send resume and references by May 1, 1981 to **Dr. Ray Sisson, Dean, School of ASET, University of Southern Colorado, Pueblo, CP 81001.**

An Affirmative Action/
Equal Opportunity Employer.

MANAGER DATA PROCESSING

SYSTEMS PROGRAMMING

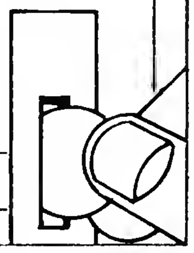
We are a Chicago-based, international manufacturing company, a leader in the field of electro-mechanical and electronic systems. Our immeidate requirement is for an experienced DP Manager who will become a part of our expanded DP/M.I.S. function at our corporate headquarters facility.

The successful candidate will possess strong applications experience in operations systems, including a minimum of 3-5 years of proven managerial experience, strong DP systems programming technical background and hands-on knowledge. Medium Burroughs system experience a definite plus.

This is a position of high visibility. Starting salary and fringe benefits package are very attractive. Please send resumes including salary history and requirements in confidence to:

Mr. Gregory M. Watts
BALLY MANUFACTURING CORP.
2640 W. Belmont Ave.
Chicago, IL. 60618

Bally



INSURANCE SYSTEMS

SR. SYSTEMS ENGINEER $32,000

DATA PROCESSING MANAGER $38,000

PROJECT MANAGER $35,000

DATA BASE CONSULTANT $ OPEN

These are a few of the new client openings in several attractive locations nationwide (New England, Midwest, Southeast, Southwest).

If you have a good track record in life insurance systems installation or development and are currently working for an insurance company or consulting firm, we'd like to hear from you.

Our approach is to meet with you personally to discuss your goals and describe the opportunities in detail. Then, if you are interested and we have a match we schedule the next step.

If you are ready to move up or would just like to talk, give us a call.

BILL DE FUNIAK, FLMI
314 N. Garfield
Hinsdale, Illinois 60521
(312) 887-9790

JACK EDWARDS, FLMI
380 Maple Avenue, West
Vienna, VA. 22180
(703) 281-0919

Jack Edwards Associates
INSURANCE DATA PROCESSING -
OUR ONLY SPECIALTY

EDP - ADVANCED SYSTEMS ANALYST

YOU'LL GET 42% MORE FOR DOING WHAT YOU DO BEST!

Right now you may be making a good salary doing what you're doing, but we know that you could be making up to 42% more working at Oasis Oil Company's Corporate Headquarters in Tripoli, Libya.

We are located on the Mediterranean, with climate similar to that of Southern California, within two to three hours from most major European cities.

Salaries are commensurate with experience plus 42% (TAX PROTECTED) Expatriate Premium, cost of living subsidies, very lucrative savings plan and 30 days annual vacation plus travel time. Other exceptional benefits include: Family residence, company furnished accommodations, excellent local school K-9 and generous tuition subsidy grades 10-12.

Degree required plus a minimum of (5) years of progressive experience in major systems design/analysis and programming commercial applications. Our system is comprised of IBM 370/135, 512K core, disk and tape peripherals, terminals 3270 series. Languages ANS/COBOL, MARK IV, FORTRAN, ASSEMBLER. We are currently converting from batch to terminal processing using CICS/VS. A good knowledge of COBOL and familiarity with CICS/VS plus IBM S/370 DOS/VS power operating system is desirable.

Please do not phone.
For a confidential, local interview, send your resume including work experience, salary requirements and personal data to:

Oasis Oil Company of Libya, Inc.
Personnel Representative
1270 Avenue of the Americas
New York, New York 10020

VENTURA COUNTY SUPERINTENDENT OF SCHOOLS

SYSTEMS PROJECT MANAGER

An opportunity to live and work in the beautiful coastal city of Ventura, bordered on the north by Santa Barbara and on the south by Los Angeles Counties.

A Systems Project Manager is needed to plan, develop and coordinate the implementation of a comprehensive public educational fiscal/personnel system.

Requires a strong background of increasing responsibility in systems analysis, design and implementation of data base accounting systems. Strong experience in project management and supervision of staff required.

Beginning Salary: $26,940 plus fringe benefit package. Salary adjustment 7-1-81 and step increase 6 months after hire.

Applications may be obtained from and returned to:

Shirley Maclean, Director, Business and Personnel Services
Ventura County Superintendent of Schools
535 East Main Street, Ventura, California 93009
For information call (805) 654-2779
Final filing date is 5:00 p.m., May 29, 1981

EQUAL OPPORTUNITY EMPLOYER

RETAIL PROJECT MGR.

Respected quality retail chain seeks indiv. to direct merchandise info. sys. Must be familiar with forecasting, sales & vendor analyses, quality assurance & invty. control. Excellent mgmt. benefits. Salary $35,000. (Fee Paid). Contact Gerry Battista.

Robert Half of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200
Personnel Consultants

CLASSIFIED ADVERTISING ORDER FORM

Computerworld's
Classifieds work.

Issue Date: Ad closing is every Friday, 10 days prior to Issue date.

Sections: Please be sure to specify the section you want: Time and Services, Software for Sale, Position Announcements and Buy/Sell/Swap. (Available upon request: Software Wanted, Turnkey Systems and Real Estate.)

Copy: We'll typeset your ad at no extra charge. Please attach CLEAN typewritten copy. Figure about 25 words to a column inch, not including headlines.

Cost: Our rates are $84.70 per column inch. (A column is 2" wide.) Minimum size is two column inches (2" wide by 2" deep) and costs $169.40 per insertion. Extra space is available in half-inch increments and costs $42.35. Box numbers are $10.00 extra.

Billing: If you're a first-time advertiser, (or if you have not established an account with us), WE MUST HAVE YOUR PAYMENT IN ADVANCE.

Ad size desired:

_____ columns wide by _____ inches deep.

Issue Date(s): ____________________

Section: ____________________

Signature: ____________________

Name: ____________________

Company: ____________________

Title: ____________________

Address: ____________________

____

Telephone ____________________

Send this form to:
CLASSIFIED ADVERTISING,
COMPUTERWORLD

375 Cochituate Road
Box 880, Framingham, MA
01701

MARK IV

PROGRAMMER / ANALYSTS

SRZ SOFTWARE SERVICES, INC., the national leader in MARK IV consulting, has openings for experienced programmers and analysts skilled in the design and development of MARK IV or MARK IV/IMS systems. Permanent full time positions are currently available in:

- **NEW YORK / NEW JERSEY**
- **BOSTON / CONNECTICUT**
- **CALIFORNIA / ARIZONA**
- **TEXAS / OKLAHOMA**

Our very competitive salaries are enhanced by bonuses, company paid medical, life & long term disability insurance, tuition refund, and a liberal expense policy. If you are interested in a career as a professional consultant please send a resume or call us collect:

JIM DODD
SRZ Software Services
61 North Maple Avenue
Ridgewood, N.J. 07450
(201) 444-9800

STEVE COMEAU
SRZ Software Services
The Jenney Building
Route 101A
Amherst, N.H. 03031
(603) 882-6234

TONY LAMIA
SRZ Software Services
50 West Hillcrest Drive
Thousand Oaks, CA 91360
(805) 497-6975

JACK HEMPSTEAD
SRZ Software Services
3329 Crossbend Road
Plano, Texas 75023
(214) 867-0030

NOTE: Additional considerations made to those who are capable of extended or frequent travel.

Experience in other nonprocedural type languages such as RAMIS II and FOCUS would also be of interest in our NY/NJ operation.

DAN MEAGHER KNOWS IT ALL.

He knows where the best openings are in New England and around the U.S. He knows the decision makers who can provide quick feedback on your resume and he knows how to present your resume so that it will get the attention it deserves. He knows a good offer from a bad one and he'll work hard to get you the best offer he can.

Dan is a Professional Counselor with E.P. Reardon Associates, one of New England's most prestigous professional placement firms. He specializes in placing Engineering and Scientific Software Professionals in the following areas:

Operating Systems
Computer Architecture
Interactive Graphics
Language Development
Peripherals
CAD/CAM
Networking
Diagnostics
Simulation
Modeling
Compiler Development
Data Communications
Data Base Construction and Maintenance

To find out how Dan can help you, call him today at (617) 329-2660 or send him your resume at the address below.

Clients are EOE.

E.P. Reardon Associates
888 Washington Street, P.O. Box 228, Dedham, Mass 02026

DOS/VS(E) SUPERSTARS

APPLIED DATA RESEARCH is seeking DOS/VS and VSE system software specialists to develop a wide variety of advanced software products. Top salaries, state-of-the-art projects, and excellent growth opportunity. Outstanding environment for those who want a challenging career. Reply in confidence to:

Director, Software Products Division
APPLIED DATA RESEARCH, INC.
Route 206 and Orchard Road, CN-8
Princeton, New Jersey 08540

An Equal Opportunity Employer, M/F/H/V

ADR

Computer Compiler Professionals

MIMD FORTRAN

DENELCOR needs a few talented

COMPILER WRITERS

To help design and implement an optimizing

FORTRAN 77 COMPILER

for the first production

MULTIPROCESSOR SUPERCOMPUTER

Salary open. Please contact:

Burton J. Smith
DENELCOR, INC.
14221 E. 4th Ave.
Aurora, CO 80011
(303) 340-3444

An Equal Opportunity Employer

CURIOUS ABOUT CLASSIFIEDS?

If you are interested in advertising with Computerworld, but don't know how to do it, give us a call! We'll be glad to send you our current rate card, which explains sizes, costs, deadlines and requirements. Along with that, we'll send a demo paper which actually shows examples of ad sizes, typefaces, and prices. **Our toll free number of 800-343-8474, in Massachusetts call 879-0700, just ask for Classified Advertising.** Or, you can look for our classified order form located in the classified section of Computerworld. Fill it out, attach your ad with a check, and return it to us. We're at 375 Cochituate Rd., Box 880, Framingham, MA 01701. Send attn: Classified Advertising. We're anxious to help!

Is Your Income Keeping Pace With the Computer Salary Boom?

To find out, call today for our new 1981 Computer Salary Survey... It's FREE!

Salaries of computer professionals have risen this year by as much as 20%. Is yours keeping pace? How does your current salary compare with those of other professionals at your level of responsibility and experience? Is your income growth keeping up with inflation? Are you making as much money as you should be—or *could* be? Is your career heading in the right direction?

Now you can easily find out, simply by calling Source Edp and asking for your copy of our just-released, **1981 Computer Salary Survey and Career Planning Guide.** It's yours, *free!*

National salary averages for 1981 are shown for each of 48 categories including programming, software, systems design, data communications, mini/micro systems, data base, EDP auditing, computer marketing, management and many others—at various levels of experience.

The Survey also defines each level of responsibility, shows you how to establish career goals, develop a plan of action, evaluate your progress, take corrective action when necessary and in general, keep your career growth on the best possible course.

This is a career tool every computer professional should have, *especially* if you have most of your career ahead of you.

The 1981 Computer Salary Survey and Career Planning Guide has been compiled by Source Edp, North America's largest recruiting firm devoted exclusively to the computer profession. Since 1966, our annual Survey has helped thousands of computer professionals make the best decisions for their future. And now, at the threshold of sweeping changes in the industry, this new Survey can be of particular importance to you.

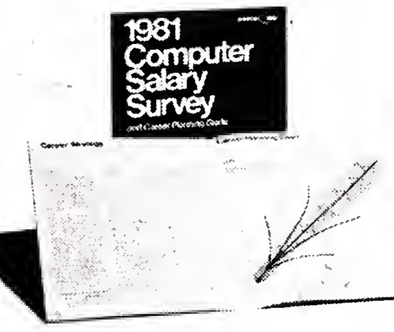
Call for your free copy of the 1981 edition today—in strict confidence, and with no obligation whatsoever to use our services.

source edp

North America's largest recruiting firm devoted exclusively to the computer professional. Client organizations assume our charges.

Call today for your FREE report

Simply phone the Source Edp office nearest you



If unable to call, write:

Source EDP, Department CS7
Suite 1100
100 South Wacker Drive
Chicago, Illinois 60606

(When writing, please be sure to indicate home address and current position title.)

United States	
Arizona	
Phoenix	602/258-9333
California	
San Francisco	415/434-2410
Palo Alto	415/856-0600
Los Angeles	213/386-5500
Van Nuys	213/781-4800
Torrance	213/540-7500
Irvine	714/833-1730
San Diego	714/231-1900
Colorado	
Denver	303/773-3700
Englewood	303/571-4450
Connecticut	
Hartford	203/522-6590
Stratford	203/375-7240
District of Columbia	202/466-5890
Florida	
Miami	305/624-3536
Georgia	
Atlanta Central	404/588-9350
Atlanta Suburban	404/325-8370
Illinois	
Chicago	312/782-0857
Northfield	312/441-5200
Oak Brook	312/986-0422
Rolling Meadows	312/392-0244
Indiana	
Indianapolis	317/631-2900
Kansas	
Overland Park	913/888-8885
Louisiana	
Baton Rouge	504/924-7183
New Orleans	504/561-6000
Maryland	
Baltimore	301/727-4050
Massachusetts	
Boston	617/482-7613
Burlington	617/273-5160
Wellesley	617/237-3120
Michigan	
Detroit	313/259-7607
Southfield	313/352-6520
Minnesota	
Minneapolis	612/544-3600
St. Paul	612/291-2467
Missouri	
St. Louis County	314/862-3800
St. Louis Downtown	314/231-4880
Kansas City	816/474-3393
New Hampshire	
Nashua	603/880-4047
New Jersey	
Cherry Hill	609/482-2600
Edison	201/494-2800
Paramus	201/845-3900
Union	201/687-8700
New York	
Midtown	212/736-7445
Wall Street Area	212/962-8000
Long Island	516/364-0900
White Plains	914/683-9300
North Carolina	
Greensboro	919/294-6550
Ohio	
Cincinnati	513/769-5080
Cleveland	216/771-2070
Dayton	513/461-4660
Oregon	
Portland	503/223-6160
Pennsylvania	
Philadelphia	215/665-1717
King of Prussia	215/265-7250
Pittsburgh	412/261-6540
Texas	
Dallas Downtown	214/749-1900
Dallas North	214/387-1600
Fort Worth	817/338-9300
Houston Central	713/751-0100
Houston Suburban	713/626-8705
San Antonio	512/344-0217
Virginia	
McLean	703/790-5610
Washington	
Seattle	206/454-6400
Wisconsin	
Milwaukee	414/277-0345
Canada	
Toronto	416/364-2919
Don Mills	416/425-5730

COMPUTERWORLD

memo

To: All Computerworld classified advertisers.

From: Computerworld staff.

Date: April 20, 1981.

Re: National Computer Conference Issues.

A reminder to all that NCC is drawing near. To be sure you get your ads in, please reserve space early.

Here is a list of those issues:

NCC Show Issue — Appears on May 4. Note early closing for black and white ads is April 23.

NCC Wrap-Up Issue — Appears May 11. Closing for black and white ads is May 1.

See you at NCC!

375 Cochituate Rd., Box 880, Framingham, MA 01701
(617) 879-0700, (800) 343-8474
Classified Advertising

SYSTEM 34 INTERNAL CONSULTANT

High level position in newly installed SYSTEM 34 environment reports to VP of finance. 5+ years in DP with SYS 34, RPG programming and management exp. Define requirements, make recommendations (including hardware), design and implement systems. Light travel to remote sites.

$35,000 FEE PAID

Call: MARTY AMATO

ROBERT HALF
OF NEW YORK, INC.
522 Fifth Avenue
New York, N.Y. 10036
212-221-6500 (agency)

Computer Science faculty position to begin in September, 1981. While our preference would be to locate someone with advanced degree in Computer Science and significant computer background, these qualifications are in very short supply. Thus, we will seriously consider someone with a Master's degree whose primary training is not in computers. Position requires teaching in some area of FORTRAN, COBOL, SPSS, or advanced courses. Nine-month teaching responsibilities with possibilities for summer teaching. Excellent salary, based on qualifications. Apply by May 15 with resume or phone call to: **Dr. Lee T. Bryant, Computer Science, State University College, Geneseo, NY 14454 (716) 245-5581.** AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER.

DESIGN ENGINEER

Rockwell International's Collins General Aviation Division in Costa Mesa, California, has an excellent opportunity for a Design Engineer with an avionics background.

You'll upgrade existing software and design new software for long range navigational aircraft systems using TI 9900 equipment. You must know BASIC and Assembly language programming.

Rockwell offers an excellent salary and benefits package, which includes company-paid health, life and dental insurance. Please send resume to:

Collins General Aviation
Rockwell International
3000 Airway Avenue
Costa Mesa, CA 92626

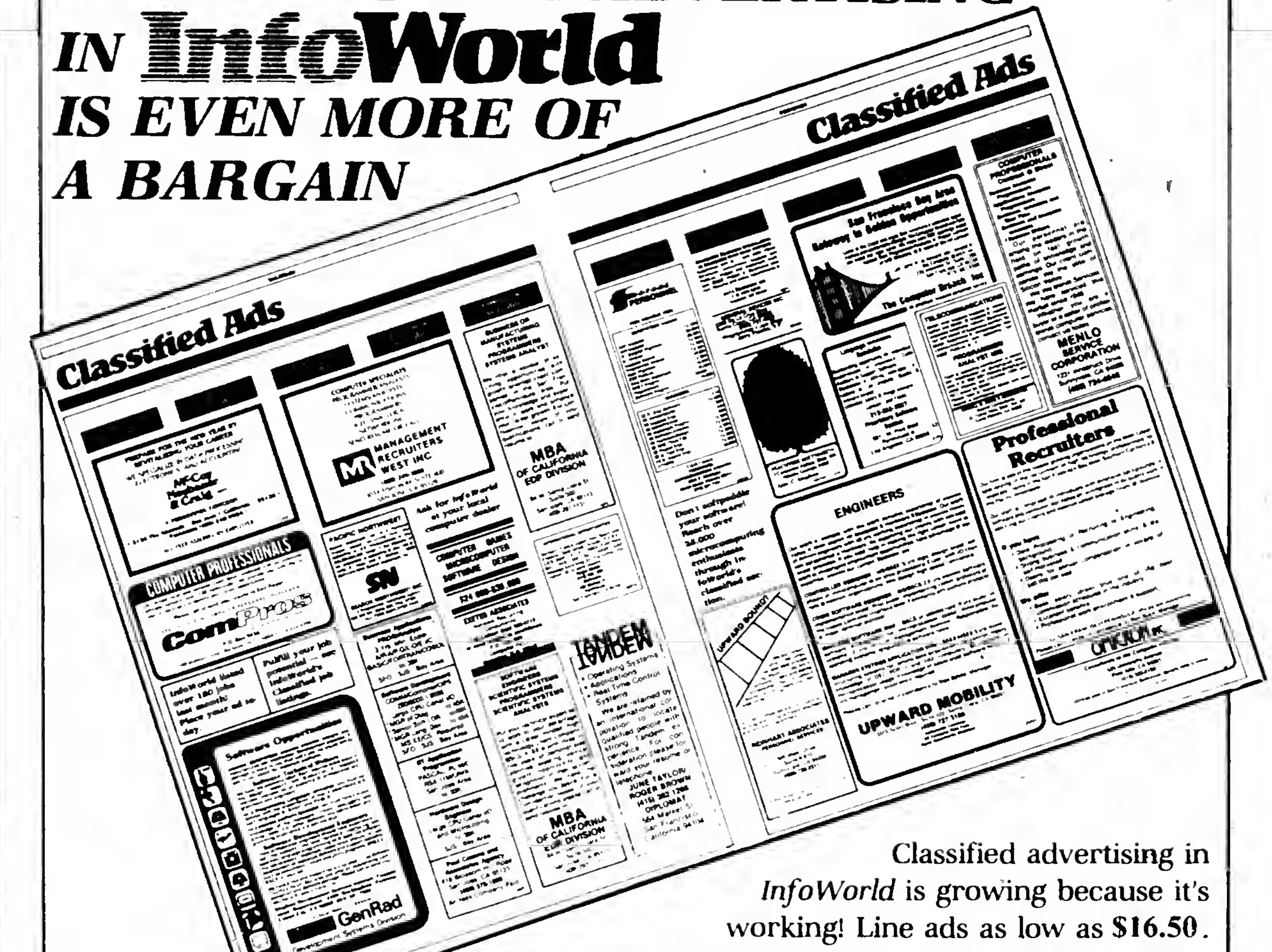
Rockwell International

Equal Opportunity Employer M/F

where science gets down to business

A BARGAIN . . . IS A BARGAIN . . . IS A BARGAIN

NOW CLASSIFIED ADVERTISING IN InfoWorld IS EVEN MORE OF A BARGAIN



Classified advertising in *InfoWorld* is growing because it's working! Line ads as low as **$16.50**. A 4 inch display ad costs only **$100.00**. And for you, a special deal! Mention this ad and receive a **10% discount.** To place an ad or receive a complete media kit, call Lynne Matthes.

Outside California call **TOLL FREE**
(800) 227-8365

Inside California
(415) 328-4602

Laboratory Automation/ Systems Management

Betz Laboratories, a leader in specialty chemicals for industrial water treatment, needs an experienced individual ready to assume full responsibility for a state-of-the-art laboratory automation and data management system focused on chemical analyses. Additional expansion of the system is planned and will involve further interfacing of analytical instrumentation, as well as continuing software development.

Applicants should be capable of hardware interfacing, mini computer system management and applications programming in support of multifaceted departmental needs. Responsibility will include direction of two professionals. Familiarity with DEC's PDP-11 Series, DECNET, RSX-11M, FORTRAN, MACRO and BASIC would be a distinct advantage. Several years experience in the above environment is a requirement for the position.

If you have a B.S./M.S. Degree in one the physical sciences, chemistry preferred, with the above technical knowledge and experience and are looking for a challenging position with an excellent starting salary, bonus and benefits package, please forward your resume to JACK O'BRIEN, TECHNICAL RECRUITER.

BETZ®

Betz Laboratories
4636 Somerton Road
Trevose, PA 19047

Equal Opportunity Employer M/F/H/V

DATA PROCESSING OPPORTUNITIES

...To work in the Boston area and other U.S. locations (Relocation assistance provided).

We're looking for:

SENIOR SYSTEMS PROGRAMMERS/ SYSTEMS PROGRAMMER

Here you'll be involved in resolving complex technical problems, long range planning (including resource forecasting) and state-of-the-art conceptualizing.

The ideal candidates should have a college degree with experience in MVS internals, teleprocessing, access methods and system performance monitoring. We are presently using an Amdahl V8, hosting CICS, DBMS applications, and TSO/SPF On-Lines with related Batch operations.

We also employ an IBM 3032, with IMS, TSO/SPF with related Batch operations. Some locations support heavy teleprocessing needs and are currently converting to NJE.

SENIOR SYSTEMS ENGINEERS

You're needed for a demanding, challenging position of responsibility. You should be very well versed in operating systems, MVS, teleprocessing, access methods, databased management systems, and hardware monitoring/simulation techniques.

You'll be involved in resolving complex technical problems; long-range planning, including resource forecasting; and state-of-the-art conceptualizing.

You should have a degree, 2-4 years of appropriate experience, and good communications skills.

GTE Data Services was organized in 1967 by GTE to meet the challenges of slowing the rapid rise of Data Processing costs, reducing the number and variety of computer systems in use, developing generalized computer programs for use by all of our telephone companies and handling tremendous volumes of information.

We met these challenges head on and accomplished what we set out to do.

As GTE Data Services enters the 1980's we are expanding our responsibilities and areas of service.

If you think working for a world leader would be exciting send your current resume and salary history to Mr. George E. Lewis, 189 Wells Avenue, Newton, MA 02159.

GTE Data Services

We are an equal opportunity employer, M/F.

SYSTEMS ANALYST

Current, Inc. (Looart Press) a leading national manufacturer of greeting cards and fine stationary items is expanding its' systems analyst team and is seeking a Systems Analyst for our Marketing department. This new position is responsible for interfacing between marketing department program users and the Management Information Systems Department. We are seeking an individual with 5 years programming/analyst experience with a minimum of 2 years as an Analyst. Experience on Honeywell equipment and in COBOL language would be preferred. We offer a competitive compensation package and progressive work environment. Forward resume, salary history and requirements to.

CURRENT, INC. (Looart Press, Inc.)
3525 N. Stone Dept C9
Colorado Springs, CO 80907

ATTN: SAM SARGENT

Equal Opportunity Employer M/F

Take the shuffle out of the search. Subscribe to the Computerworld Index.

(For details, call or write our Circulation Department)

COMPUTERWORLD

TECHNICAL AIRLINE SYSTEMS SPECIALIST

We are a major high technology company with a challenging and exciting program to develop innovative automation systems for the transportation industry. We seek an individual with extensive airline systems knowledge and operations experience to join the team responsible for this effort.

As the lead airline systems specialist, the ideal individual should have six to eight years experience in the design, development, and implementation of airline reservation systems, departure control systems, and airline communications. Practical knowledge of airport passenger processing and industry standards would be a plus.

We offer a competitive salary, comprehensive benefits, a midwest location that provides fine cost-of-living advantages, and opportunities to move ahead in a company that will make continual strides in advanced automated systems development. Relocation assistance available.

Please send confidential resume and salary history to:

CW Box 2546
375 Cochituate Rd.
Box 880
Framingham, MA 01701
An Equal Opportunity Employer

EMPLOYMENT SERVICE FOR PROGRAMMERS AND ANALYSTS

National Openings With Client Companies and Through Affiliated Agencies:

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support.

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees. We guide, you decide

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 230, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agents for Computer Professionals

Software opportunities with the leader in nuclear instrumentation.

The subsidiary of a publicly held company, we design and build nuclear instrumentation products. We're the leaders in this rapidly growing field, and are enjoying unprecedented growth and expansion — especially at all levels of our software development division.

Located in suburban Atlanta, we can offer you sophisticated design work in a scientific setting, and the opportunity to share in our growth.

We're looking for professionals who possess these four qualifications:

- FORTRAN programming
- Real-time minicomputers
- Process control interfaces
- Data communications

Additional experience desired:

- ASSEMBLER and BASIC, Data Base
- HP1000, DEC LSI-11
- Nuclear industry applications

The specific openings are:

SOFTWARE DEVELOPMENT ENGINEERS

Design and program software for scientific instrumentation in the nuclear industry. Base salary to $25,000.

SOFTWARE DEVELOPMENT SUPERVISORS

Assume a leading role and participate in the development of scientific software. Minimum 3 years' scientific programming experience is required. Base salary to $35,000.

SOFTWARE DEVELOPMENT MANAGER

Manage the development division of this leader in the nuclear instrumentation industry. Minimum 5 years' experience supervising technical design staff. Base salary to $45,000.

PROJECT MANAGERS

Total management of technical projects, including customer liaison, equipment procurement, and coordination of hardware and software shipment. Knowledge of health physics, or software preferred. Base salary to $45,000.

We provide comprehensive benefits which include life insurance, and family health plan with dental coverage. Please forward your resume, including salary history, in confidence to:

CW Box 2547
375 Cochituate Rd
Box 880
Framingham, MA 01701

An Equal Opportunity Employer M/F

SOFTWARE SUPPORT PROFESSIONALS

CALL THIS TOLL-FREE NUMBER THIS WEEK: 800-525-7101

Technical Managers from Digital/Colorado Springs want to tell you about an exciting new concept in customer service.

Here's your opportunity to get full details on Digital's Remote Diagnostic Center in Colorado Springs — a center that can solve customer problems 24 hours a day.

Talk to our Technical Managers and you'll learn how we plan to double the size of our staff over the next 12 months.

You'll learn how everyone who joins us becomes a key member of a highly interactive software team — and enjoys the special satisfaction of interfacing with customers and seeing immediate results.

You'll also get information on the attractive lifestyle you'll enjoy in Colorado Springs, a cosmopolitan city surrounded by wide-open spaces and the scenic beauty of the Rockies.

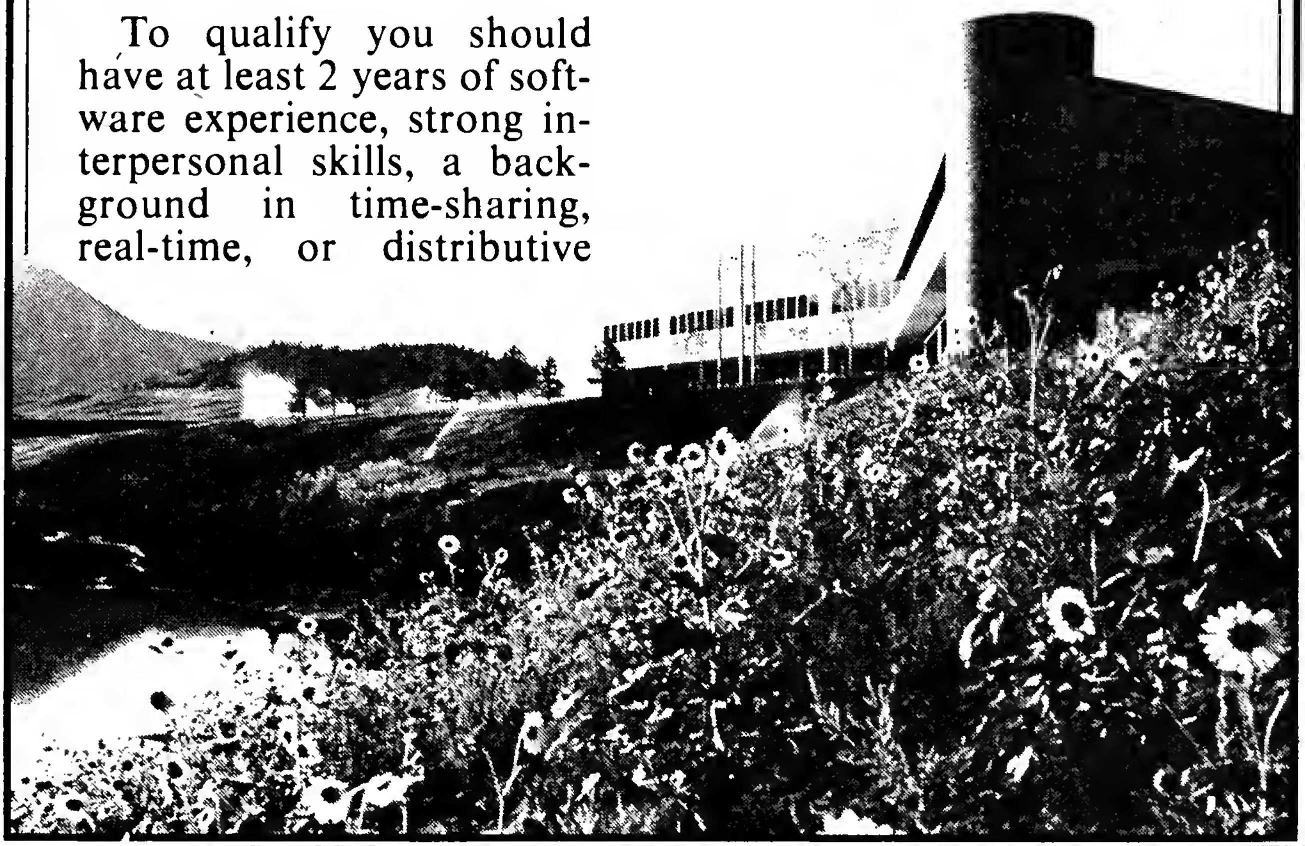
To qualify you should have at least 2 years of software experience, strong interpersonal skills, a background in time-sharing, real-time, or distributive processing environment, and the ability to research, structure, and communicate solutions to complex and varied software problems.

We'll provide competitive salaries, generous benefits, and relocation assistance. Call us toll-free, 9:00 AM - 4:00 PM (MST), Monday-Friday at 800-525-7101. Or send your resume to: Larry Crockett, TSC Personnel, Digital Equipment Corporation, Dept. 0420 3807, 301 Rockrimmon Blvd. South, Colorado Springs, Co. 80919.

We are an affirmative action employer.

digital

We change the way the world thinks.



REGIONAL SALES MANAGER

Publicly owned software company seeks a self-starter in the Los Angeles area and Philadelphia, Washington D.C. or New York area with marketing-sales background in new account selling. Individual would contact and sell prospects software and hardware in a vertical market. Training, sales aids and installation services provided by headquarters. You, grow your own region and add sales people. Salary plus commissions, bonuses and stock options with company benefits. Send resume and/or inquiries to CW Box 2548, 375 Cochituate Rd., Box 880, Framingham, MA 01701.

INSURANCE SYSTEMS

S.E. client seeks indiv's with min. 2 yrs. ins. & COBOL bkgrd. to provide P/C support to multiple users. Salary to $25,000 (fee paid). Contact Stan Durbas or Paul Meissner.

Robert Half of Hartford, Inc.

111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

Personnel Consultants

CHARGE US!

(You can charge your subscription to Computerworld on American Express, Visa or Mastercharge)

COMPUTERWORLD

New Orleans
Looking for the Cream

My clients are looking for the exceptional data processing professional. If you are in the top 10% of your field and have a desire to live in the south's most interesting city you owe it to yourself to contact us at Professional Staffing.

We are a highly successful recruiting firm dedicated to the placement of technical professional like yourself. So, if you are looking for unprecedented professional opportunity with an added bonus of warm weather, creole food, and an enviable life style, call collect or write.

Joe Hotard
Data Processing Recruiter
Professional Staffing, Inc.
1250 Poydras St. Ste 820
New Orleans, LA 70112
504/524-6095

Software Professionals

Holland Systems Corporation is a rapidly growing software development company creating state-of-the-art data base applications and design systems. We are about to embark on the development of several major systems which have created openings in the following areas:

Project Leaders

Develop specifications and coordinate programming activities. Experience in COBOL, IBM-Assembler, and large system design and development is required. Background in data dictionary, IMS and CICS would be pluses.

Application Programmers—Analysts

Design and implement application program modules from general specifications. Experience in COBOL and/or IBM-Assembler required. Background in data dictionary, IMS and CICS would be pluses.

Systems Development Programmers

Design and implement operating environment and storage management interface subsystems. Experience in IBM-Assembler, MVS or VS1 or CMS internals, CICS or IMS-DC, and VSAM desired. Background in data dictionary and COBOL would be pluses.

Holland System Corporation offers excellent salaries and an exceptional benefits package. If you would like to become part of our rapidly growing organization, send your resume to:

Manager of Systems and Development
Holland Systems Corporation
3131 South State Street, 8303
Ann Arbor, Michigan 48104

Programmer Analysts

Professional Growth Begins At APS.

Arizona Public Service Company needs innovative professionals to help meet the energy needs of our fast growing state. Immediate openings exist for Programmer Analysts to apply engineering, optimization, quantitative and programming skills in developing algorithms and computer programs. Responsibilities include the design, development and maintenance of planning and analysis models, i.e. generation, financial, production costs, fuel budget, system reliability, energy storage and maintenance optimization.

A BS degree in engineering, mathematics or computer science is required. A knowledge of statistics, probability and operation research is desired. A minimum of 2 years utility and/or IBM experience is preferred.

Arizona Public Service can offer you an abundance of challenges and the opportunity for professional growth. If you're interested in a more promising future with a growing company, send a detailed resume to: Jean Bethune, CW420,

aps.
ARIZONA PUBLIC SERVICE CO.

Station 1102
P.O. Box 21666
Phoenix, Arizona 85036

An Equal Opportunity Employer M/F

PROGRAMMERS & ANALYSTS

CALIFORNIA FOR YOU IN '81.

Local Interviews
Are Being Scheduled
Right Now. Call Ron York
For Your Appointment
(213) 386-0400 Call Collect . . .

INDIANAPOLIS	CHICAGO
DES MOINES	CLEVELAND
OMAHA	WASHINGTON, D.C.
ST. LOUIS	COLUMBUS

We are looking for Exper. Programmers & Analysts now for California Positions.
Expenses & Relocation All Paid.
For A Good Job In California Call Collect

(213) 386-0400

informatics inc
3255 Wilshire Bl., #610, Los Angeles, CA 90010
Positions Also Available Throughout The West Coast ®

UNIVERSITY OF VERMONT ANALYST PROGRAMMER I

The Administrative Computing Center is seeking an Analyst Programmer I with a Bachelor's Degree, preferably in a scientific or business related discipline. Applicants must have two to four years of experience in systems analysis and programming, two of which must be in COBOL under IBM/DOS. Applicants with experience in higher education applications, on-line systems or DBMS preferred. We offer an excellent benefits package. Salary to high teens commensurate with experience. **Send resume and 3 professional references by May 15, 1981 to University of Vermont, OMIC, 238 Waterman Building, Burlington, Vermont 05405.**

An Affirmative Action Employer

COMPUTERWORLD CLASSIFIEDS WORK!

- POSITION ANNOUNCEMENTS
- BUY SELL SWAP
- SOFTWARE
- TIME & SERVICES
- SOFTWARE FOR SALE
- REAL ESTATE
- BUSINESS OPPORTUNITIES

It's easy to advertise in COMPUTERWORLD. If you don't have an advertising agency to supply us with copy, layout and order, or a camera ready mechanical, stat or film negative of your ad, just call Sue Stevens at 1-800-343-6474. She will be glad to take your ad and typeset it in available fonts at no extra charge. If you have lengthy ads that require logos and artwork, just send a clean typewritten copy of your ad to the classified advertising department at COMPUTERWORLD (telecopier service is available): note the ad size you want; and, if you want your company logo to appear in your ad, please be sure to include a camera-ready copy with your insertion order. You should also supply any special borders, headlines and artwork that you want in your ad. Our Art Department will follow your suggested layout as closely as possible if you wish to send one.

Ad closing is every Friday, 6 working days prior to issue date.

Rates: Open rate is $84.70 per column inch. Columns are 2" wide. Minimum ad size is 2 column inches (1 column wide by 2 inches deep), and costs $169.40 per insertion. Additional space is available in half-inch increments. Some sample sizes and costs are shown.

1 col x 4" — 338.00
2 cols x 4" — 677.60
2 cols x 5" — 847.00
2 cols x 8" — 1355.20

Discounts are available when you run more than 35 column inches of advertising in a year anywhere in Computerworld.
Box Numbers are available. $10 per insertion.
Ad Closing is every Friday, 6 working days prior to issue date (issues are dated Monday).

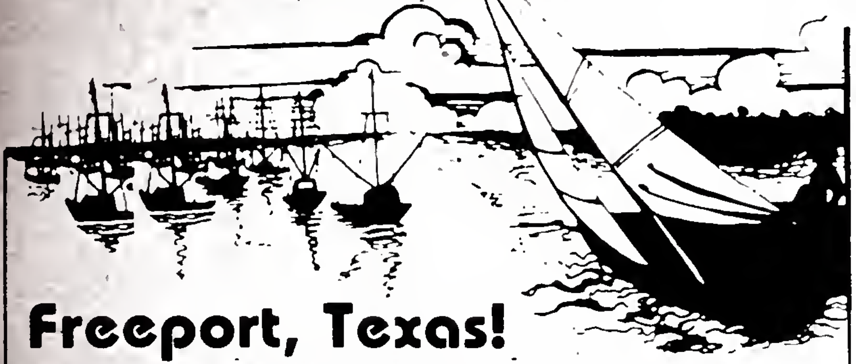
To reserve space for your ad, or if you'd like more information on Classified advertising in COMPUTERWORLD, call our office nearest you.

Boston - (617) 879-0700
New York - (201) 967-1350
Chicago - (312) 827-4433
San Francisco - (415) 421-7330
Los Angeles - (213) 450-7181
TELECOPIER SERVICE - (617) 879-0700

William J. Mills, Manager Classified Advertising

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY.

OPPORTUNITIES
TEXAS GULF COAST



Freeport, Texas!

At Intermedics we are creating new medical technology in the Texas Gulf Coast town of Freeport. While we are best known for developing a whole new generation of cardiac pacemakers, we've also made major contributions to the technology of monitoring systems and intraocular lenses. If you are a professional who is looking for a rare challenge, consider the following opportunities:

TECHNICAL SUPPORT ANALYSIS

This professional must have 3-5 years systems experience with RSTS/E on PDP 11/70 computers. Must have good verbal and written skills and a strong background in BASIC PLUS and/or BASIC PLUS 2. The successful candidate will interface with systems programming and the applications departments of Intermedics and all subsidiary companies.

DATA BASED ADMINISTRATOR

The candidate should have a working knowledge of management data flow from low level operational computer systems to decision support data base and the implementation of data gateways for control of information. In addition, the individual should possess a minimum skill of 1-3 years programmer experience, and be familiar with the usage of communication network and a data base system. Experience with PDP 11 is preferred.

PROGRAMMERS/ANALYSTS

The successful candidate must have at least 2 years or more experience in program development on mini-computers, preferably D.E.C. including 1 year experience in statistics and graphics.

These positions provide an attractive starting salary, excellent opportunity for advancement, company paid relocation, company paid insurance, three months temporary living allowance as well as many more benefits.

Qualified applicants may submit a resume in confidence to Professional Staffing Manager, Dept. AR-20 P.O. Box 617, Freeport, Texas 77541, or call our National WATS, 1-800-231-2330 or our Texas WATS, 1-800-392-3726. Intermedics is an equal opportunity employer m/f.

Intermedics Inc.

Our business is life.

NIGERIA
COMPUTER PROFESSIONALS

Nigerian Nationals are required by the Shell Petroleum Development Company of Nigeria Limited with varied technical backgrounds such as; Geology, Petroleum Engineering and General Engineering for the computer positions detailed below:

SYSTEMS ANALYST/DESIGNER

Requires a BS or equivalent in a technical or commercial discipline plus at least 2 years COBOL or FORTRAN programming experience and 1 year Systems Analysis or Design experience. Knowledge of on-line programming and mini-computer applications a plus. Starting Salary: N10,800.

SENIOR PROGRAMMERS

Requires a BS or equivalent in a technical or commercial discipline plus at least 2 years COBOL or FORTRAN programming experience. Starting salary: N9, 000.

THE PROFESSIONAL ADVANTAGES: You'll work on an IBM 370/145 environment under DOS/VS in our Lagos office. Should you be transferred to our Eastern Operations Division in Port Harcourt you'll find an equally progressive IBM 370/135 installation and an IBM 3780 RJE Terminal in our Western Operations Division in Warri linked via microwave to Port Harcourt. Throughout the entire operation you'll deal with the latest concepts in interactive processing and mini-computer applications plus a wide range of commercial and technical systems development for stimulating and interesting variety.

ELECTRICITY ALLOWANCE-(Taxable):

Staff earning less than N9,033 p.a. will be paid N50 p.m. Staff earning N9,033 p.a. and above will be paid N70 p.m.

LEAVE ALLOWANCE:

Leave allowance is the equivalent of one month's basic salary free of tax.

LEAVE TIME:

Senior staff are entitled to annual leave of 36 consecutive calendar days. Public holidays falling within the leave period may be added to the annual leave.

MEDICAL:

The Company runs medical insurance schemes for in-patient and out-patient treatment.

PROBATIONARY PERIOD:

All new staff will have to undergo a probationary period of one year.

PROVIDENT FUND:

An employee becomes eligible for membership of the Fund on confirmation of his appointment. The employee contributes 5% of that part of his salary which is excess of the level of salary on which contributions are payable to the National Provident Fund. The Company contributes into the Fund 7.5% of his annual basic salary on his behalf.

PENSION SCHEME:

Members of the Shell Nigeria Provident Fund are automatically members of a non-contributory pension scheme. Pension age is 55 years for men and 50 years for women.

HOME OWNERSHIP SCHEME:

On attainment of 5 years in company service, the employee is eligible to join the Company's Home Ownership Scheme. The company will recommend qualified staff to a commercial bank for a mortgage loan to purchase or build a house for their own occupation.

AMOUNT OF HOUSING SUBSIDY:

	LAGOS	WARRI
Staff earning N6,957-N11,083 p.a.	N230 p.m.	N200 p.m.
Staff earning N11,084-N14,987 p.a.	N260 p.m.	N230 p.m.
Staff earning above N14,987 p.a.	N300 p.m.	N260 p.m.

STAFF IN COMPANY ACCOMMODATION:

Staff in company provided accommodation will not receive the Housing subsidy. Other staff temporarily occupying company provided bachelor accommodation in outstations, and those on short term transfers will both normally be eligible for Housing subsidy provided they are not retaining a company house.

Should staff in company provided accommodation vacate such accommodation the appropriate rate of housing subsidy will apply.

TRANSPORT ALLOWANCE:

Staff earning from N6,350 to N10,355 p.a.	— N70 p.m.
Staff earning above N10,355 p.a.	— N80 p.m.

CAR LOAN:

On confirmation of his appointment the employee is eligible to apply for a loan to purchase a car. The amount of each loan shall be the employee's one Year's basic salary up to a maximum of N11.000.00.

Interested applicants should submit resume to:
RECRUITMENT DEPT. 111
SCALLOP CORPORATION
One Rockefeller Plaza, New York, New York 10020
Scallop Corporation is a Royal Dutch/Shell Group Company
An Equal Opportunity Employer M/F

JBA

JOHNSTON, BROWN & ASSOCIATES, INC.

JBA is a world-wide organization providing support exclusively to the IBM system/34 and system/38 community. Our objective is to assist our clients to achieve maximum benefit from their data processing installations through use of JBA's unique **Advanced Management Software Systems** and **Professional Services.**

ACCOUNT MANAGERS

If you are highly motivated to succeed and can demonstrate a proven track record of success in software marketing and sales, there could be a place for you with JBA's dynamic and professional **Marketing** group.

SOFTWARE PROJECT MANAGERS

If you have successfully managed D.P. projects of varied levels of size and/or sophistication, and have a history of completing projects on schedule and within budget, you should consider a position with JBA's **Professional Services** group.

To pursue a career with JBA, forward your resume and salary history to:

Johnston, Brown & Associates, Inc.
1465 Enea Circle, Building E
Concord, CA 94520

Salaries are commensurate with education and experience.

Computerworld's classifieds work.

(That's why you see so many of them.)

COMPUTERWORLD

OPERATIONS ANALYST

Ball State University has an opening for an Operations Analyst to perform problems analysis on production abends. Responsibilities also include, the control and coordination of JCL activities and the analyzing of computer usage for efficiency and enforcement of standards. Excellent fringe benefits, 18 days paid vacation per year, educational assistance. Salary commensurate with experience.

Send resume and salary history to:
Personnel Services Office
BALL STATE UNIVERSITY
Muncie, IN 47306
Application deadline april 30, 1981
An Equal Opportunity/Affirmative Action Employer

BUY SELL SWAP

EQUIPMENT AVAILABLE

Description	For Sale/ Lease	Date
	370/168	
M upgrade for 168	sale or lease	now
2880-2 (1862)	sale or lease	now
2880-2 (1862, 3851)	sale or lease	3/1/81
	370/158	
Mod 1 to Mod 3 upgrade for 158	sale or lease	now
3058 for 158	sale or lease	now
Features 1434, 1435, 1850, 2150's, 2151, 4650's, 5552's, 6111's, 7840's, 7905's, 3851	sale or lease	now
	370/148	
148-K00 (2152, 4660, 6111, 8075, 8100, 3203-4, 3047-1)	sale or lease	4/1/81
	370/145	
145-I (6982, 7855, 3345, 3046, 8810, 3215)	sale or lease	now
145-I (6982, 6983, 7855, 8810, 3046, 3345-2, 3215)	sale or lease	now
Feature 6983, 6984	sale or lease	now
	370/138	
3138-I00 (3046-1)	sale or lease	now
	370/135	
135-FEO (4670, 4672, 7855)	sale or lease	now
135-GD (4650, 3046, 3215)	sale or lease	now
Memorex memory	sale or lease	now
	370/125	
125-H00	sale or lease	now

Contact: Jack Northrop
Lease Financing Corporation
3 Radnor Corporate Center
100 Matsonford Road
Radnor, Pa. 19087
215/527-4450

LFC

CDLA Member Computer Dealers & Lessors Association

Series/1

S/32
S/34
S/3
S/38
5110
5120

BUY • SELL • LEASE

COI

COMPUTER OPTIONS, INC.

The Best Option in IBM Computers

Parkdale Plaza Bldg. #428W
1660 So. Highway 100
St. Louis Park, MN 55416

612 • 544 • 8660
800 • 328 • 5718

DEC and DATA GENERAL

11/60

now only

$13,995.

32 Kw core in cabinet

DEC 11 DEALS!

PDP11/40	8 Kw	$ 6,995
PDP11/35	8 Kw	$ 8,695
PDP11/45	32 Kw	$15,500
PDP11/05	8 Kw	$ 2,950
PDP11/04	32 Kw	$ 8,995
PDP11/34A	from	$ 8,970
MS11-JP	16 Kw, $2,350 list	$ 699
MM11-L	8 Kw, $3,900 list	$ 399
DP11-DA	Interface, $3,570 list	$ 550
KMC11-A	Aux. processor, $2,350 list	$ 1,500
KE11-B	Arith. Element, $1, 950 list	$ 995
RP04-AA	88 Mb, $27,200 list	$ 9,995
RP11C-RP03	40 Mb, $39,880 list	$ 6,500
RP03	40 Mb, $25,030 list	$ 4,000
RP11/RPR02	20 Mb, $31,400 list	$ 5,995
RK06-EA	14 Mb, $11, 200 list	$ 5,500
RX11-BA	256 Kw, $4,600 list	$ 2,495
RX11-AA	128 Kw, $3,600 list	$ 1,995
TA11-AA	90 Kc, $4,800 list	$ 599
LP11-VA	300 lpm, $12,600 list	$ 4,995
LA36-CE	20 mA, $2,700 list	$ 995
VT52-AA	CRT, $2,250 list	$ 799

NEWMAN COMPUTER EXCHANGE
1250 N. Main P.O. Box 8610 Ann Arbor, MI 48107
(313) 994-3200

Member:
Computer Dealers Association
S412CW

SYSTEM 3-32-34-38

SERIES 1-5110

WANT TO BUY ANY SYSTEM 34

Available: S34-E35-E34-C23-C24-D35
5251-11, 5251-12, 5256-03

Communication: 3271, 3272, 3277, 3284
3284, 3286, 3288, 3776
3777, 3780, 3704, 3705

Peripherals: 3741, 3742, 129, 029, 059
3715, 3717, 083, 514, 548
3410, 3411, 3340, 3344

GENE NICHOLL TOM KLEEFISCH

AMERITEX COMPUTER CORP.
14229 Proton Road
Dallas, Texas 75234
214/934-9151

—H • P—

1000 — 2000 — 3000

PROCESSORS – PERIPHERALS

2112A — CPU 7900A — 5MB
2113A — CPU 7970B — 800BPI
2100A/S — CPU 7970E — 1600BPI

TERMINALS

2640A 2645A
2640B 2649B
2631A 9871A

MEMORY

1247A/H 128KB 13187A 32KB
3000 III 256KB 3000 II 128KB
2100 MEMORY I/O Cards

CRISIS COMPUTER CORP

2356 Walsh Ave., Santa Clara, CA 95051 (408) 727-0431
For domestic & international sales TWX 910-338-7330

WANT TO BUY

3148-K	CPU (15C and Madrids)
3138-J	CPU (any configuration)
3203-04/05	Printers
3803-02	Tape Control
3420-06/08	Tape Units
3411/3410-03	Tape Units (370 attach)

Contact: Pat Milton

DAC Buys Rental Credit Equipment
Call or Write

DATA AUTOMATION CO., INC.
4858 Cash Road
Dallas, Texas 75247
214-637-6570
TWX-910-861-4240

CDLA Member Computer Dealers & Lessors Association

BUY • SELL • LEASE

TAPE

3411•3410

3420

DISK

3340•3344

3350

Call Bob Ford
or Nelson Johnson

S/3

ALL MODELS
(8, 10, 12, 15)

S/32

S/34

Call Gayle Drotar
Roger Odom
Ken Winzen

370 Systems
(Models 115-138)

4331

Call Donna Sage

370 Systems
(Models 145-168)

4341

3031•3032

3033

Call Jack Harvey

Want our capabilities brochure? Send us your business card.

ECONOCOM

1755 Lynnfield Road
P.O. Box 17825
Memphis, Tennessee 38117
901-767-9130
Member CDLA

3742's

Lease for less.

We can save you
as much as
29% per month.

Call Betty Wildman or Marcia Bryan

ECONOCOM

1755 Lynnfield Road
P.O. Box 17825
Memphis, Tennessee 38117
901-767-9130
Member: CDLA

The HARDWAREHOUSE has your numbers.

· CALL US TODAY AT (602) 248-6848, PHOENIX, ARIZONA
OR CALL OUR LOCAL OFFICE IN YOUR AREA

Boston: Eastern Regional Headquarters	**(617) 272-8110**
Washington, D.C.	(703) 521-0300
New York	(212) 832-2622
Philadelphia	(215) 293-0546
San Francisco: Western Regional Headquarters	**(415) 283-8980**
Los Angeles	(213) 670-7994
Denver	(303) 534-7436
Seattle	(206) 447-1682
Portland	(503) 228-7033
Chicago: Central Regional Headquarters	**(312) 298-3910**
Pittsburgh	(412) 922-8920
Detroit	(313) 961-1675
Minneapolis	(612) 370-1153
St. Louis	(314) 353-8285
Austin: Southern Regional Headquarters	**(512) 451-0121**
Atlanta	(404) 768-6535
Dallas	(214) 233-1818
Houston	(713) 447-0325
Canada: Toronto	**(416) 366-1513**
Montreal	(514) 281-1925

GREYHOUND COMPUTER CORPORATION

SUBSIDIARY OF THE GREYHOUND CORPORATION

DEC VAX

Systems Memories Peripherals

Immediate Short Term Deliveries

call
BROOKVALE ASSOCIATES

800/645-1167 **516/567-7777**

BUY & SELL
ALL

WANG

COMPUTER EQUIPMENT & WORD PROCESSORS

617/372-8536

CFR ASSOCIATES, INC.
18 GRANITE STREET
HAVERHILL, MA. 01830

NCR USERS

We deal exclusively in NCR Computer Equipment. If you're buying or selling deal with the nations oldest and largest. Contact Gary E. Zywotko.

(612) 884-0758

Computer Connection Corp.

8120 Penn Ave. South
Minneapolis, MN 55431

"THE BURROUGHS COMPUTER DEALER" HAS AVAILABLE NOW

B2805 SYSTEM

400KB IC Mem. Supervisor Term Display, 300 CPM Rdr
1800 LM Prtr, (2) 200KB Mag Tape Units, 17.4 MB Bytes
Disk Pack, Basic Multiline Cntr and 8 Channel Ext

WE BUY, SELL AND LEASE:

B1800 thru B6800 Systems along with all peripherals and memory

ALL EQUIPMENT GUARANTEED FOR MAINTENANCE

Call Collect CMC COMPUTER MARKETING CORP
5651 North Seventh St
Phoenix, Arizona 85014
Telephone 602 264-5151
Telex 165-712

DEC and DATA GENERAL

WE WANT TO BUY:

ONE ONLY **AD01-DA**

AVAILABILITY IS PRIORITY

LARGE QUANTITIES-
DEC UNIBUS

SHOULD INCLUDE:

CPU STORAGE PRINTERS TERMINALS

OR

GOOD QUANTITIES OF SAME ITEM

WE'LL PICK UP YOUR SYSTEM

ASK FOR EXTENSION 221

REMEMBER, your surplus minicomputer equipment may never be worth more than it is today. Don't miss out . . . call or write our Purchasing Department for quotation TODAY.

Call or write for FREE booklet: "Convert Surplus Minicomputers Into Cash."

S418CW

NEWMAN COMPUTER EXCHANGE
1250 N. Main P.O. Box 8610 Ann Arbor, MI 48107
(313) 994-3200

Member
Computer Dealers
Association

AMDAHL

V62 — 2, 3, or 4 Year Lease
V8 — 3 or 4 Year Lease or Sale

Al Hewitt
CANADA LEASE
416/279-8400
U.S. Res. 416/449-0866

Available in Canada or U.S.A.

CDLA

Available *NOW!*

VAX

Currently In Use
We Can Reconfigure

CALL 617-437-1100

A AMERICAN USED COMPUTER
P.O. Box 68, Kenmore Station, Boston, MA 02215

We Buy & Sell
DEC
Systems
Components

Digital
Computer
Resale

call: 713
440-5845
5527 Pine Arbor
Houston, Tx 77066

FOR SALE
IBM
3814 4x8
3814 8x8
3814 4x16
5/22/81 ship
Jack McAuliffe
214-661-3981
4255 LBJ Freeway, Suite 210
Dallas, Texas 75234

IBM

3270

PRINTERS, TERMINALS
& CONTROLLERS
Please Call: (312) 943-3770
Forsythe/McArthur Associates.
Inc.
919 North Michigan Avenue
Chicago Illinois 60611

DATA GENERAL
We
Buy And Sell
New And Surplus
Systems And
Peripherals
Call Or Write
Hanson
DATA SYSTEMS
P.O 27
Southboro, MA 01772
(617) 481-3901

WANT
TO BUY

Any Hewlett-Packard 3000 and/or peripherals.

INFO-TRONIC
SYSTEMS, INC.
246 S. River Avenue
Suite 206
Holland, MI 49423
(616) 392-5905

IBM 3042-2 APU
Available June '81
IBM 3052 APU
Available April '81

JBI ASSOCIATES, INC.
12973 West 3rd Place
Lakewood, CO 80228

Contact: JerryA. Borisy
(303) 988-0820

For Sale

DG NOVA 4/X

256K memory, 8382-x Mul/Div, 8388 Floating Point, 6099 12.5 meg disk, (2) 6103 25 meg disks, 6021 Tape Drive, 6086 Printer, (4) 6108 D200 CRT's, 4241 ULM 5, 1144B Cabinet.

Used 4 months, immediate shipment, flexible terms.

John Burnap, Jr.
(203) 968-8715

SERIES/1, SYSTEM/32, SYSTEM/34, SYSTEM/3, SYSTEM/38, PERIPHERALS

CASS MARKETING CAN DELIVER YOUR NEXT IBM SYSTEM QUICKLY.

We specialize in full SERIES/1, SYSTEM/32, SYSTEM/34, SYSTEM/3, and SYSTEM/38 systems, upgrades, or add-ons. We have our own field engineers on staff to remove or install your system. And all IBM systems from Cass Marketing are guaranteed to qualify for full IBM maintenance and support.

Cass Marketing Services is dedicated to the IBM system user. We've specialized in IBM equipment for more than 3 years. We take trade-ins, we offer leases, we rent, we sell, and we buy. Call Cass Marketing now for any equipment you don't see listed below.

AVAILABLE NOW:
- **IBM 5285, Data Entry System**
- **All System/34 upgrades**
- **IBM SYSTEM/3 Model 15 – Various sizes**
- **IBM 4955-E System**

WANT TO BUY:
- **All SERIES/1; SYSTEM/34 configurations**

Cass Marketing Services Inc.
535 N. Brand Blvd. Suite 838
Glendale, California 91203
(213) 956-4982 collect or
(800) 423-2662 toll
free outside
Calif.

FOR SALE	WANT TO BUY
Qty. 3278-02 w/4621,4623	3274-1B,1C,1D
3289-02	3277 w/4633,4631
3288-02	3272 w/3250's
3284-02	3288-02
3286-02	
3271-02 w/7821,3250	
3287-02 w/8331,8700	

SKIP STONE

DAC Buys Rental Credit Equipment
Call or Write
DATA AUTOMATION CO., INC.
4856 Cash Road
Dallas, Texas 75247
214-637-6570
TWX-910-861-4240

CDLA Member Computer Dealers & Lessors Association

ALL 360 & 370 SYSTEMS

CPU's & Peripherals
Purchased, Sold & Leased

CORPORATE COMPUTERS, INC.

Contact:
Norm Burger

(203) 661-1500
115 Mason St., Greenwich, Conn. 06830
Member Computer Dealers Association

VT100 W/AVO OPTION
$1450.00

VT100-AA	VIDEO DISPLAY TERMINAL	$1350.
VT100-AB	DISPLAY TERMINAL V/AVO OPTION	1450.
VT132-AA	DISPLAY TERMINAL-BLOCK MODE/AVO	1550.
LA120-AA	DECwriter III 180CPS	1975.
LA120-RA	DECwriter III RECEIVE ONLY	1795.
DT80/1	DATAMEDIA CRT W/AVO & PP	1350.
DT80/2	DATAMEDIA NO/AVO OR PP	1145.

QUANTITY ONE - CASH PRICE - WHILE QUANTITIES LAST

ComManD, Inc.
6435 Castleway Drive - Suite 133
Indianapolis, Indiana 46250
(317) 842-3900

CMI

AMERICA'S LEADING SPECIALIST SERVING THE USED MARKET

3081
2 Available
4th Qtr. '81 1st. Qtr. '82
Lease Only

3033-U12
Spring Availability

3032
Sale or Short Term Lease
3031
Sale or Lease
Bob Laurie

AMDAHL-V5
Sale or 24 Month Lease

3168
IBM/OEM Memory, Channels
Short Term Lease or Purchase

3158-3's
Available Immediately
Short Term Lease or Sale

3148 3138
Lease or Sale
Immediate Delivery

4341-K1
SN #10289
Available Now
Group 2's for 3rd. Qtr.

4331
30 Day Delivery
At Prices Well Below
Manufacturer's
Group 1 & Group 2

SYSTEM 3
Models
12 and 15
Dennis Pennington

SYSTEM 34
SYSTEM 32
Dennis Pennington

3276
3274/3278
3287/3289
Kay Richard

3880 3420
3370 3411
3380 3203
3340 3211
Buy/Sell/Lease
Pat Callahan

BUY/SELL/LEASE
3350
Pat Callahan

COMMUNICATIONS
Buy-Sell-Lease
IBM 3705
IBM 3704
Immediate Delivery Configured
To Your Requirements
Pat Ducey

CMI CORPORATION
Since 1969
755 W. Big Beaver, 19th Floor, Troy, Michigan, 48084
(313) 362-1000

MARKETING
Dallas, Texas (214) 385-0806
Greenwich, Connecticut (203) 869-2440
Long Island, New York (516) 673-9517
New Jersey (609) 645-7282
Montreal, Quebec (514) 288-8455
Windsor, Ontario (519) 258-8910
Geneva, Switzerland Telex: 289073 CMI CH
Paris, France Telex: 613910 CMI FR
CMI FINANCIAL SERVICES, INC.
755 W. Big Beaver, 20th Floor, Troy, Mich. 48084
(313) 362-1000

Member CDLA

FOR LEASE

370/158-3 w/ISC MADRIDS	4/1
370/158-3 w/1433, 1434, 1435	4/1
3211, 3811	4/15
370/155-II	4/1
3830-2	4/1

FOR SALE OR LEASE

370/158 I	1/81
3830-2 w/2150, 2151, 6111, 8170, 8171	1/81
3211	4/15
3811	4/15
3350	5/1

WANTED

3350/3033 CPU New or Used
3 Yr. Lease on any 303X

Call (212) 482-8640
Charlie Albright
Sha-Li Leasing Assoc.
40 Wall St. N.Y. 10005

AVAILABLE

4341's/4331's

and all 370 CPU's and peripherals

Randolph

800 243-5307

Randolph Computer Company
Division of The Bank of Boston
537 Steamboat Rd.
Greenwich, CT 06830
203 661-4200

CDLA

For lease

IBM 4341-L1

September 1981 availability

MDFC
MCDONNELL DOUGLAS FINANCE CORPORATION
• 100 OCEANGATE • LONG BEACH CALIFORNIA 90802 • TELEPHONE (213) 593 8471

REGIONAL OFFICES

Daniel O. Andersen	Jerome Butkow	Thomas Lambach
Chicago	New York	San Francisco
(312) 693-2279	(212) 682-1515	(415) 956-3628

MCDONNELL DOUGLAS

HOW FAST ARE WE?

Call Us Now!
Most Equipment In Stock
For Immediate Delivery

Buy • Sell • Trade • New And Used
DATA GENERAL • DEC

- Ampex
- Century Data
- Printronics
- Data Products
- Tanberg
- CDC
- Soroc
- Hazeltine
- Diablo
- Centronics
- Western Dynex
- GE

DATA GENERAL		DEC	
Eclipse 128KW	6400	New VT 100's	SAVE
DG 6045 Controllers	1500	New MS 11LB	3900
Eclipse 32KW MOS	1800	New MS 11LD	5800
New D/100, D/200. QTY. DISC.		MS 11JP	695
Various DG Modules	STOCK	Various DEC Modules	STOCK

CRC
Computer Resale Consulting Inc.
490 West Main St., Avon, MA. 02322
Call George Trawinski (617) 583-6460
Out Of State 800-343-1092 TWX/TELEX 7103451290
DG Peripheral And Board Repair Available

FOR SALE

IBM Financial Controllers

3601-A3
3604-4
3604-5
Available 4-1-81

Call John
404/998-1004

SERIES/1 5110
S/32 S/34 S/3

PERIPHERALS
(408) 425-7333

IBM
MAINTENANCE
GUARANTEED

SOURCE DATA PRODUCTS, INC.

555 Soquel Ave
Santa Cruz,
CA 95060

For Sale By Owner

DEC

PDP 11/60 Systems
with RSX-11M Licenses

ALSO

RK07 Disk Drives
TE10 Tape Drives
Superb Condition
DEC Maintained
Available Immediately

For More Information
Call Sue Stone
617/923-6518

FOR SALE

CODEX 9600 BPS and 4800 BPS MODEMS

Low prices:
$1950 and $1050 each
Immediate delivery
Factory warranty

Take immediate delivery on Codex high speed data modems!

Codex is offering limited quantities of its reliable "C" Series modems, all with 90-day factory warranty.

These units have been reconditioned and offer proven performance and reliability.

For further details call Mike Mullo (617) 364-2000, ext. 3794, or write Codex Corporation, 20 Cabot Boulevard, Mansfield, Massachusetts 02048. Telex: 92-2443.

codex
A Subsidiary of MOTOROLA INC.
We'll get you through

DEC

PDP 11/55	Retail	Our Price
- w/64KB Bipolar Memory - 192KB Memory - LA 36 - BA 11 KE - 1 - DZ 11-A - RSTS V-7.0 - DIBCL RMS11-K - Datatrieve	$104,019	$32,800
- 800/1600 BPI-45-tape Controller & Drive in a cabinet (DEC Compatible)	$ 14,922	$ 5,200
- (2) RPR02 Disc Drives & Controller (40 MB Disc)	$ 23,000	$ 6,900

(312) 956-1050

IBM

5110 / 5120

SYS 32 SYS 34
BUY - SELL
IBM MAINTENANCE GUARANTEED

NATIONAL DATA SYSTEMS, INC.
50 Congress Street
Boston, MA 02109
(617) 720-0370

S/32 — S/34

5110 3741 3742
All Peripherals
15 to 30% Discount

LEASPAK INTERNATIONAL

D/FW Metroplex
817/288-0023 (Metro)
BUY SELL LEASE

---

(5) RP06-AA Disk Drives

Available Immediately
$26,000 Each
DEC Maintained
Certified for Maintenance

N.E. Minicomputer Inc.
337 Boston Rd.
Billerica, MA 01821
Call John or Guy
617/663-2550
Out of State Call
800-343-8302

BUY • SELL • LEASE • TRADE

SYSTEM 3 15D
Available Immediately
Sale or Lease

SYSTEM 34 or 38
Purchase/Leaseback
Substantial Savings

Call for a Quote
(812) 546-0207

NORTHERN GROUP LTD, INC.
2124 IDS CENTER
MINNEAPOLIS, MN 55402

System 34's Urgently Needed

FOR SALE DEC & DEC Compatible

Systems	Components
11/23	BA11KE
11/34	DZ11A
11/44	DZ11E
11/70	DD11DK

Spartin Systems
14925-A Memorial Dr.
713-496-0771

Want To Buy

Data General Computer Equipment

Call for quote
216/247-2100
Strictly Hardware, Inc.
100 N. Main St.
Chagrin Falls, Ohio 44022

FOR SALE

9 -Tally 1612-RO 160cps Printers, with Quick-Tear & Vernier adjustment options (boxed-never used)

24-Infoton I-100 CRT Terminals, with green phosphur screen & VT-52 emulation

8 -DEC RK-07 Disc Packs

Mr. Ahmed V. Ismail
Studio Camera & Electronics
(313) 881-6200

USED NEW

PRIME COMPUTERS

Buying & Selling

150's, 250's, 300's, 400's, 350's, 450's, 550's, 650's, 750's
Memory, Controllers, Peripherals
Complete Commercial Applications Software

Ask about our Turnkey Service Bureau Program
OE/AR/GL/AP/PR/ MFG

Datamation Services, Inc.

5050 No. 19th Ave., Phoenix, AZ 85015
800-528-0198 602-242-3793
Don Shifris

Hardware Bargains

New Peripherals

Description	List	Net
Adds Viewpoint	$650	$585
Adds Regent 25	$1095	$803
Adds Regent 40	$1300	$956
Adds Regent 60	$1500	$1050
Printronix 150LPM	$5480	$3975
Printronix 300LPM	$6380	$4875
Printronix 600LPM	$8380	$6750
URC (Prime 3156)	??	$2500

These prices are so low that we must have full payment with order — shipped frieght collect.

Used Prime
On Maint. Devices
Add 5% Finders Fee

300MB Disk Drives	$19,000
Tape Drive 8/16-75	$14,500
256K Memory (E4)	$8450
AMLC (5054)	$1500
Complete 400 System 512K ECC, 300MB 16 Port	$55,000
Standard Tape Drive	$7000

Market Brief

SYSTEM 3/15 BARGAINS GALORE

Availability of all System 3/15's is excellent and users of System 3/10's and 3/12's can now upgrade their systems very inexpensively. Model B systems now sell at less than $40,000 and even D Models can be had for under $50,000. For further information about prices and availabilities call our GSD Product Manager — Ron Gibb.

Computer Merchants inc
75 South Greeley Avenue • Chappaqua, N.Y. 10514
(914) 238-9631

SELL/LEASE

IBM 3277 CRT's w/4833 Keyboards
1250.00 EA.-Quantity Discounts
Available Now
PRICED BELOW MARKET
IBM 3277 w/4630, 4631, 4632 Keyboards
3271, 3272 Controllers
3284, 3286 Printers
IN STOCK

R ASSOCIATES, INC.
14441 Memorial Dr., Suite 18
Houston, Texas, 77079
713-870-1500

BUY / SELL / TRADE
PURCHASE LEASEBACK
IBM 3 / 32 / 34 / 38
GSD 5251 / 3741 / 3742

COMPUTER SALES and LEASING, INC.
5100 Edina Industrial Blvd., Edina MN 55435

Phone Collect: 612-830-1028
John Griffin

Immediate Delivery

3370

Disk Drives

call
Bob Bardagy

312-698-3000
Or Your Local Office

COMDISCO

DEC NOW

Vax Systems	CALL
11/23AA or Datasystems	NOW
RL01's, RL02's	Stock
11/34A systems	NOW
11/70 W/RP06's or RM03's New and Used	NOW
Peripherals, disc tape, and boards	CALL
RX02's, DD11, BA11's	Stock
TI Terminals	NOW

WANTED FOR CASH

any and all DEC systems and peripherals
All inquiries immediately answered

DATAWARE
SYSTEMS LEASE, INC.

30 Bay St.
Staten Island, N.Y. 10301
(212) 447-4911
Telex 429394
TWX 710-588-6738

WANTED!

MOST ALL
NCR
ELECTRONIC EQUIPMENT

SMITH ANDERSON CORP.
68-757 SUMMIT DRIVE
CATHEDRAL CITY, CA. 92234
(714) 346-3227
(714) 324-4427

COMDISCO®

Your First Choice ☑
In The Second Market

IBM PROCESSORS

☐ 3033 Will Buy/Lease/Finance
☐ 3032 Systems Available 30-60 Days
☐ 3031 24-36 Month Leases
☐ 3168 Systems Available Now
☐ 3165 Good Price Performance
☐ 3158 All sizes — Short Term
☐ 3155 One Year Leases
☐ 4341 Systems Available 30-60 Days
☐ 3148 12-24 Month Leases
☐ 3145 Month-to-Month
☐ 3138 Month-to-Month
☐ 3135 Month-to-Month

MISCELLANEOUS

☐ Channels/Memory Immediately Available
☐ 3704/05 Call Karen Johns 312/698-3000
☐ 327X Call John Christopher 312/698-3000

IBM PERIPHERALS

☐ 3880 Immediate Availability
☐ 3370 For Sale/Lease
☐ 3350 Immediate Availability
☐ 3420 All Models Available
☐ 3330 15-Day Delivery
☐ 3340/44 For Sale/Lease

We Can Put It Together

Branch Offices:

Atlanta	404-256-5956
Chicago	312-698-3000
Connecticut	203-853-6966
Dallas	214-258-6444
Florida	305-428-3177
Ft. Worth	817-534-1774
Michigan	313-644-1500
New Jersey	201-568-9666
San Francisco	415-944-1111
Washington, D.C.	301-441-1000
Latin America	305-666-6258
Toronto	416-498-7220
Paris	297-2000
Switzerland	021-71-09-35
West Germany	(2434) 3948

Corporate Headquarters
Comdisco, Inc.
6400 Shafer Court 312/698-3000
Rosemont, IL 60018 TWX — 910-253-1233

MEMBER CDA/CLA

DEC USERS

RJM02 67MB
Identical Systems
$13,950

Software Compatible
with DEC System
CDC 9672
Drive
Pedestal
67MB Pack
Controller
Installation on site
90 day on site Warranty

North American
Technology Inc.
916/920-9092

BURROUGHS

FOR SALE
MT983's
B1900 Complete Systems
B1800's B2800's
B3800's B4800's
B6700 Planar Memory
B9246 2 1800 LPM Printer

DSI, INCORPORATED
2480 W. Alameda Ave.
Denver, Colorado 80223
(303) 922-8331
Telex: 910-931-0483

Member Computer Dealers Association

Inflation Fighters

Quality & Savings

Slightly used, Money Back Guarantee. Full Reels. All External Labels Removed Guaranteed for use at 1600 BPI through 6250 BPI.

2400' Reel	$4.95 ea.
1200' Reel	$4.25 ea.
600' Reel	$3.50 ea.

All Tapes with Hanging Seals
We pay freight on orders over 200 tapes
All orders shipped within 48 hours
Call or Write
Computer Tape Mart
169 B New Highway
Amityville, New York 11701
[516] 842-8512

DEC EQUIPMENT FOR SALE

DISCS	PROCESSORS	TAPES	MEMORY
RP06-AA	11-70	TE16	MK11
RP06-BA	11/34A	TU10	MS11
RP04	11/40		MS780
RPR02			
RM03	**OPTIONS**	**CABINETS**	**MISC**
RM02	FP11	H967	LP11
RK05,06,07	KT11	H960	LA180
RL01,02	KE11	BA11	CTS11-KM

Carl R. Boehme & Assoc., Inc.
Specialists in Digital Engineering
408/727-2666
Telex 172337

DEC and DATA GENERAL

125 SYSTEMS

11/23, 11/34,
11/70, 11/44
VAX 11/750

UP TO 18% DISCOUNT ON
VAX 11/780

FREE CATALOG

S413CW

NEWMAN COMPUTER EXCHANGE
1250 N. Main P.O. Box 8610 Ann Arbor, MI 48107
(313) 994-3200

We · buy · sell · and lease · IBM Computer Systems

Available for
Immediate delivery!
•CPU's•CRT's•Printers•All Models•

CALL:
•STEVE HOUGH
•DICK GEYER

Pearl® EQUIPMENT CO., INC.

PEARL EQUIPMENT COMPANY, INC.
(615) 383-8703 P O BOX 24026 • 4717 CENTENNIAL BLVD • NASHVILLE TN 37202

LEASE (We're sole owners)

- **3081 Systems & Components**
- **4341 Group II Systems (1981 Delivery)**

SALE or LEASE

- **360/50 Tape System (Available 5/81) with/Hi-Speed I/O**
  - 029s with or without Interpreter
  - 129s some with feature 4601
  - 3741-3742-3747 All Configurations

PURCHASE/LEASEBACK ARRANGED

System 32 & 34, 3740 Equip. • Most IBM Peripherals

IOA DATA CORP

CALL GEORGE GILMAN
I.O.A. DATA CORP.
Toll Free 800-221-8438
N.Y. (212) 673-9300
383 Lafayette Street, New York, N.Y. 10003

DEC COMPUTERS

11/44, 11/34A, 11/70, also RK07 BASED 11/750 & 11/780

COMPONENTS

TU77, TS11, MS780, MS750 RK07, RL02, RL01, FP11-A DZ11-A, DZ11-E, DH11-AD, ALSO JULY DELIVERY RM05-AA

C.D. Smith & Assoc., Inc.
12605 East Freeway, #318
Houston, Texas 77015
Telex: 76-2547 CDSMITH HOU
713/451-3112

Contact: Bernie Gest
(215) 782-1010

7704 Seminole Ave.
Melrose Park, Pa. 19126

Computer Marketing Inc.

4341 - K or L

WITH PERIPHERALS
SALE OR LEASE

DASD • 3880 • 3370 • 3310
IMMEDIATE DELIVERY

WANTED FOR PURCHASE
DISKS — TAPES — PRINTERS

DEC AVAILABLE IN STOCK **DEC**

PDP 8 systems and accessories in stock.
11/34A CPU's and Systems.
11/70 CPU's with 50 hz or 60hz, 64kb to 512kb.
NEW 11/23 CPU's with Dual RL01's In Stock
(2) **CDC 80MB Drives** w/Emulex Ctrl. $21,500

BA11KE	$3250 New
FP11A	$3200 New
KW11K	$ 800 Used
MS11KE	$4250 New
MS11LD (256KB)	DEC equiv. $3000
RK711 FA	$20.500
RX02 Drive	$3000 NEW

ICS 11-MA Industrial control sub-system 50% off list
11/34A, 32KB, M9312, DL11WA, KY11LB $12,300
Several other Peripherals, systems, etc.

SWA South West Automation

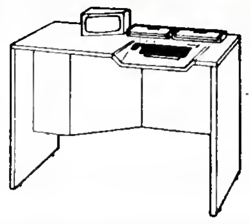
Home Office (Katy, TX)
713/371-9288

West Coast Office (Sunnyvale, CA)
408/734-1117

WE BUY AND SELL

BURROUGHS L-TC SERIES,
TC500, TC750, L6000-L9000

WE BUY•SELL•RENT



I.B.M. 3741-3742, 029-129
PURCHASE/LEASEBACK SYSTEM 34

A PHONE CALL CAN SOLVE YOUR PROBLEM
TALK TO US: (201) 343-4554

WILLIAM MARION COMPANY, INC.
P.O. BOX 309, HACKENSACK, N.J. 07602

BROOKVALE
ASSOCIATES
BUY • SELL • RENT • TRADE
DEC

MJ11-BA	64KW Core/Box	**For Rent**
MK11-BA	64KW Mos/Box	11/03 RK05J based system
MK11-BE	64KW MOS	11/23 RXV21 based system
MM11YP	32KW Core	
MS11LB	64KW MOS	**For Sale**
MS780DA	256Kb VAX MOS	VAX 11/780 System

(800) 645-1167 • NEW YORK (516) 567-7777
40 ORVILLE DRIVE • BOHEMIA, NEW YORK 11716

DEC
IMMEDIATELY AVAILABLE

Communications		Disks		Tape		Options	
DZ11	DH11	RP06	RP05	TWE16	TE16	FP11A-C	
DU11	DUP11	RP04	RP03	TJU16	TU16	FP780	
DMC11	DL11E	RP02	RM03			BA11KF	KY11LB
DL11W	DL11A	RL02	RL01			KMC11	KG11A
		RK07	RK06			MR11EA	M9301

OTHER OPTIONS AVAILABLE
CALL FOR QUOTE

NATIONAL COMPUTER
EXCHANGE
6980 ARAGON CIRCLE, SUITE 5
BUENA PARK, CALIFORNIA 90620
(714) 522-1870 (800) 854-7224 TWX 910-596-1499

SURPLUS
MICRODATA
EQUIPMENT
Call Us
We Buy, Sell
Lease and Trade
Computer Wholesalers
15926 S.E. Lake Holm
Auburn, WA 98002
206/852-2045

DG
ECLIPSE
M600 CPU with or without peripherals

Managistics, Inc.
subsidiary Chase
Manhattan Bank
32-31 57th Street
Woodside, N.Y. 11377
Call Joe Contorno
212-246-6220

WANTED

3601 3A Controllers
3604 4 Display Units

PACIFIC COMPUTER
LEASING, INC.
(206) 271-5000

FOR SALE
F.O.B. Tacoma

(1) Burroughs B816-204 Computer System 96K
(1) MHZ Processor 28 MB Fixed Disc Drive
(3) Burroughs TD 832 Display Terminals
120 CPS Printer SPO -
4.6 MB Removable Cartridge
Available 60 to 90 days -
160 LPM Printer

For more information contact **R.I. Walsh, Controller, Buffelen Woodworking Company, (206) 627-1191.**

DEC EQUIPMENT
PRICED FOR QUICK SALE
NEW

D325	D336
64KB	128KB
2 RL01	2 RL02
1 LA180	1 LA180
1 VT100	1 VT100

CONTACT:
Sandy Scoggins
Columbia Computer Co., Inc.
P.O. Box 12
Columbia, S.C. 29202
(803) 252-9105
OTHER NEW AND USED EQUIPMENT AVAILABLE

DEC

RK711PA (NEW)	$13,790.
RK07PA (NEW)	9,790.
RK06 Packs	175.
RK06 Drives	4,900
Upgrade 11/03 to 11/23	$3,350

Call Ed
ESS
514 Broadway
Fargo, N.D. 58102
701/237-0689

NEW DEC SPECIALISTS USED

SYSTEMS – COMPONENTS – PERIPHERALS

BUY or SELL

- EXCELLENT PRICES
- FAST DELIVERY
- QUALITY HARDWARE **(604) 732-1491**

ALPINE
COMPUTERS LIMITED
110 2205 FIR STREET,
VANCOUVER, B.C. CANADA
V6J 3B6

Alpine

FOR SALE OR LEASE
SERIES 1
MODELS 4955 AND 4952
MAXIMUM MEMORY
FULL PERIPHERALS
Available immediately!
Call 214/258-0541

METROPLEX COMPUTER
COMPANY, INC.
320 Decker Drive • Suite 180
Irving, TX 75062
MEMBER
TWX 910 860 9285

For Lease
4341K
Delivery
April '81

Contact:
Bob Kendall
Leasing Dynamics, Inc.
1717 East 9th Street
Cleveland, Ohio 44114
216-687-0100

DEC
RP06 AA
TWU 16AA
Available
CALL CARL ROGERS
606-278-0411

3310A2
NEW
ITC
Sale or Lease
$18,000. F.O.B. L.A.
Bell Systematics
213-553-4420

MEHISH COMPUTER
SERVICES LTD.
15 Lincoln Street Tel-Aviv 67134 Israel
Telephone 286-112
Telex 341225, 341226, 33625.

We are interested in purchasing 3 (three) machines I.B.M. 803 (Proofing Machine) in good operating condition.

If you have any to offer kindly contact us at the above address, attention:
Mr. Z. Shemesh

DEC

WE BUY & SELL DEC SYSTEMS

Call now to join our mailing list. We will inform you of our latest products as well as any sales — with savings up to 70%.

CALL
(612) 894-4020
PDP8 PDP11

MSI MIDWEST SYSTEMS, INC.
1118 East Highway 13, Burnsville, Minnesota 55337

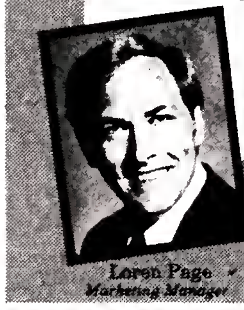
BUY...SELL...LEASE
SYSTEM/34
We'll pay you TOP $$$ for your System/34 whether purchased or on lease from IBM.
Call For Offer:

Fraxions
EQUIPMENT CORPORATION
(212) 279-0069 (713) 974-5074

DATA COMPUTER EQUIPMENT, Inc.
4050 Nathan Lane No., Minneapolis, MN 55441
TOLL FREE: 800-247-2000 Ex. 190

IBM Processors and Peripherals

TAPE 3410-3411-3420 **DISK** 3340-3344-3350-3370	**S/38 S/34** **S/32 & Other** **GSD Equip.**



Loren Page
Marketing Manager

BUY • SELL • LEASE

GET "TOP PRIORITY" ACTION...
CALL ME COLLECT!
612/559-4379

SAVE
UP TO 40%
PRINTERS

- Factory Reconditioned
- Like new, full warranty
- Serial and line printers

800-426-4944
Ask for
Ray U'Ren or Val Maddox.

MANNESMANN
TALLY

THIS
SPACE
FOR
HIRE.

[Inquire at Classified Advertising Dept.]

HP 9800

Buy/Sell
All Lines

9830 Specialists

CRISIS COMPUTER CORP
2356 Walsh Ave Santa Clara CA 95051 (408) 727-0431
For domestic and international sales TWX 910-338-7330

TIGER COMPUTER

Member CDLA

415 Madison Ave. New York, N.Y. 10017 (212) 532-1500, TLX 12333

Lease Only
3033 Memory
U4-U8 and N4-N8
Available Immediately

Short/Long Term Lease
3158-K w/2150, 2151, 6111, 4650
Available Immediately

SPECIAL

Available for Lease
4341-L in 30 Days
Group II MES
12/81

Short or Long Term Lease
3138-J w/ICA, IPA, IFA
Available Immediately

3031 3032
3033
Purchase/Leaseback or Sale

Buy/Sell/Lease

3330		3375
3340	3370	3380
3344		3420
3350		3803
3370		3830

All Models Available

Lease-Short/Long Term
3148K w/ISC & Madrids
Also J-K Mem. Upgrade
Available Immediately

A TIGER INTERNATIONAL COMPANY

SYSTEMS
360/370/4300

3333	3330
3350	3340
3830	3803
3344	3420

BUY • SELL • LEASE

COI
COMPUTER OPTIONS, INC.
The Best Option in IBM Computers
612 • 544 • 8660
800 • 328 • 5718

SHORT OR LONG TERM LEASES

Randolph

3033's

and all 370 CPU's and peripherals

800 243-5307

CDLA
Randolph Computer Company
Division of The Bank of Boston
537 Steamboat Rd.
Greenwich, CT 06830
203 661-4200

In Canada... let us quote a custom-configured IBM computer system in new condition, with quick delivery, at big savings under IBM factory prices.

Michael Kelly
Windsor, Ont.
(519) 258-8910

John Bastien
Montreal, Que.
(514) 288-8455

CMI – Remember the name

CMI COMPANY

Brand New · Full 90 Day Warranty Brand New · Full 90 Day Warranty Brand New - Full 90 Day Warranty

Scherer's

Line of *New* DEC Terminals

"Serving the DEC Community since 1976"

New Special Price **VT 100-AA $1,495 EA.***
(with advanced video option)

VT 100-AA	1,375 EA.*
VT 132-AA	1,595 EA.*
LA 34-DA	895 EA.*
LA 34-AA	995 EA.*
LA 38-GA	1,095 EA.*
LA 120-RA	1,795 EA.*
LA 120-AA	1,995 EA.*
LA 120-BA	2,075 EA.*
LA 180-EA	1,750 EA.*

Items are in stock - no limit
★Quantity 1 cash prices
Call: Sonja at (614) 889-0810

SCHERER'S MINI COMPUTER MART
6145-F Dolan Place Dublin, OH 43017

• DATA GENERAL •
• DEC •
SURPLUS SPECIALS

DATA GENERAL		DEC
NOVA* 4/X NOVA 3/D NOVA 1200 NOVA 2/10 ECLIPSE* S/230 ECLIPSE C/330	CPU'S	PDP 8 11/03 11/04 11/05 11/34A 11/45
NOVA ECLIPSE	MEMORY	MM8EJ MM6AB MM11DP MS11JP MS11LB MS11LD
6070-N 20 MEG SUBSYSTEM 6045 10 MEG DRIVES 6030 DUAL FLOPPIES 6060-A 96 MEG	DISKS	RX8BA RK05 RK8E RL01 RP02 RP03 RP04 RP06 RM02 RM03
6026 800/1600 BPI 6026-A SLAVE UNIT	MAGNETIC TAPES	TMB11MA TMB11EA
4251 COMMUNICATIONS CHASSIS 4264 SYNC. LINE MUX 4250 DCU 50 4256 ALM 4	COMMUNICATIONS	DZ11 DH11
6053 CRT'S, D-100 6012 CRT'S, D-200	TERMINALS	VT52 LA160 VT100 LA36

BUYING OR SELLING, CALL:
•DEC - Bryan Eustace 305-272-2338
•DATA GENERAL - Phil Thomas 305-272-2339

Thomas Business Systems, Inc.

URGENTLY NEEDED! ANY QUANTITY!

DEC and DATA GENERAL
computer equipment
CASH AVAILABLE

CALL TODAY!

(313)994-3200

Member Computer Dealers Association

NEWMAN COMPUTER EXCHANGE
1250 North Main Street Department CW 78
P.O Box 8610 Ann Arbor, Michigan 48107

Early IBM 3081's

JBI Associates, Inc.
12973 W. 3rd Place
Lakewood, CO 80228
Contact Jerry A. Borisy
303/988-0820
CDLA

TYMSHARE

EQUIPMENT SUPPORT DIVISION
DEALER IN COMPUTER SYSTEMS

NOW AVAILABLE

DEC 11/34, 11/70 SYSTEMS AND PERIPHERALS

LA 36HE	LP05-VA
TWE16	TE16
DZ11-A	RL11-AK
RH70	RK611

XDS/SDS SIGMA 2, 3, 5, 7 SYSTEMS

7320/7322	7231/7232
7211/7212	SIOP/MIOP

SPARES — SPARES — SPARES

AMPEX SPARES FOR DISKS, TAPES

DEAL WITH CONFIDENCE
DEAL WITH TYMSHARE
EQUIPMENT SUPPORT DIVISION
Buy — Sell — Repair
213-889-6031 (In California)
800-423-5321 (Outside California)

TYMSHARE®
Equipment Support Division

For Immediate Delivery New and Used

DEC PDP/11

RM03s, RK07s, RP06s

Call Joanne Quirk

(703) 841-5807

FOR SALE

3135-HG CPU (IFA, IPA, ICA,	5-1-81
1403-N1 w/8640	5-1-81
2501-B2	5-1-81
3340-A2	5-1-81
3344-B2	5-1-81
(2) 3420-03 w/3550	5-1-81
3803-01 w/3551	5-1-81

Jo Perry

DAC Buys Rental Credit Equipment
Call or Write

DATA AUTOMATION CO., INC.
4858 Cash Road
Dallas, Texas 75247
214-637-6570
TWX-910-861-4240

Member
Computer Dealers
& Lessors Association

AVAILABLE

IBM NEW
ITC QUALIFIED

SHIP DATE: 5-22-81

One 3814/A01-Switch Management System
One 3604/006-Keyboard Display

Contact Dave Revere

GREYHOUND COMPUTER CORPORATION
800-528-6113

DEC

BUY & SELL
SYSTEMS • PERIPHERALS

SPECIAL
NEW
FPILA—$2600

CALL REGARDING
MANY OTHER ITEMS
IN STOCK

WESTERN DATA SALES
P.O. Box 7000-158
Redondo Beach CA 90277
(213) 539-8917

Since 1977

CALMA

GDS-1 SYSTEM

Two digitizers
(2) 19 inch displays
CD114 Disk
Immediate Delivery

Romelan
502A Vandell Way
Campbell, CA 95008
408-379-9120

3033

Uniprocessor

For Lease Only

Immediately Available

Contact Your Local Office:

Atlanta	404—256-5956
Chicago	312—698-3000
Connecticut	203—853-6966
Dallas	214—258-6444
Florida	305—428-3095
Ft. Worth	817—534-1774
Michigan	313—644-1500
New Jersey	201—568-9666
San Francisco	415—944-1111
Washington, D.C.	301—441-1000

COMDISCO

FOR SALE

DATUM

MAGNETIC TAPE UNIT
MODEL D 450
9 Track 800/1600 BPI

CONTACT:
MARION MILLER
WARWICK VALLEY
TELEPHONE COMPANY
47-49 MAIN ST
WARWICK, N.Y. 10990

914-986-1101

DECsystem-10 for sale

Expected availability:
September 1981

Partial listing:

1	KI-10 processor
4	MF10G memory modules
4	RP04 disk drives
1	LP02 lina printer
2	TU10 tepe drives
1	DC10 32 line communications control subsystem

The system is undar DEC maintenance contract.

Contact:
Harold Ravlin
Coordinated Science Laboratory
1101 W. Springfield
Urbana, IL 61801
(217) 333-0287

For Sale
Make An Offer

CDC 3100 CPU and/or Peripherals

3266 Communications Terminal Controller
415 Card Punch
405 Card Reader
501 Line Printer
(2) 608 Mag Tape Transports
(4) 854 Disk Drives

And all associated controllers. Will sell in any combination of peripherals only or as a system.

205/882-4619

FOR SALE BY OWNER

UNIVAC BC/7 800 SYSTEM

128K
20 MB Disk
300 LPM Printer

System is available April 1981.
No Reasonable Offer Refused.

CONTACT
A.J. ETZEL JR.
(215) 822-1982

370/148-K AVAILABLE NOW: LOOK AT THE SAVINGS

EQUIPMENT	OUR 2 YR RATE	EQUIPMENT	IBM 2 YR RATE
148-K w/4660,	$2,000	4341-K	$7,170
2150,6111,		3278-A02	114
8075, 3047-1,		3880-1	1,735
3286-2			
IBM Maintenance			
	2,305		
Total	$4,305	Total	$9,019

You Save $113,136 over 24 month perlod

CALL NOW 201-583-6616

BUY — SELL — LEASE — BROKERAGE

Let the
"NATIONS LARGEST WHOLESALE DEALER"

Buy, sell, lease, sub-lease, or be your agent in placement of your pre-owned IBM 360/370/System 3, or other units

COMPUTER INTERNATIONAL, LTD.
CWC's international division —
experts in foreign markets, freight, customs
BEACH COMPUTER CORPORATION, CWC's Leasing Division
COMPUTER WHOLESALE CORP., (504) 581-7741
SUITE 507/508 FIRST NATIONAL BANK OF COMMERCE BLDG.
NEW ORLEANS, LOUISIANA 70112
MEMBER OF COMPUTER DEALERS ASSOCIATION

3081

November, 1981.

June, 1982

NF COMPUTER
SALES & LEASING CORP.

Oak Brook, IL
312-920-8181

Minneapolis, MN
612-854-1018

FOR SALE

11/70

256KB
RM03
TWE16
LP11/VA
DZ11-A
RX211
LA36
(3) VT100's
RSTS

Two Years Old
Immaculate
Continuous DEC maintenance
Special $78,500
Meadowlark Enterprises
Essex St.
Middleton, MA 01949
617/774-4942

For all your DEC requirements
VAX 11/44, 11/70, 11/34

IBM 3350's

(3) A/2
(3) B/2
New/Sale or Lease
July Delivery
MRI
Bud McComb
602/959-9504

For Sale

IBM System 32

9.1 megabyte disk
100 LPM printer
Call Bobby Felton
512/882-2607

FOR SALE BY OWNER

I.B.M. 1500
32K
APL and Basic
Disc Sort Feature
Fast Printer
(2) Disc Slots

Contact:
Walter or Monte'
212/840-8811

IBM S/3 For Sale by User

1 — 5410 32K one drawer CPU, 1-750 lpm printer, 3 Memorex 660 5445 disk drives, w/60mil 2/60mil byte capacity, 4 — Decision Data 9610 96cc keypunch machines, plus assorted cabinets, disk packs and supplies — complete — best offer. **Call R.J. Zink (313) 271-7202. Available 10-1-81.**

For Sale:

Complete Basic four System

Includes

- Model 400 CPU w/64k
- 10 mbyte disk drive
- 160 CPS PRINTER
- CONSOLE TERMINAL
- 4 extra Disk PAC's
- SYSTEM SOFTWARE

Call:
DELMED, INC.
(916) 444-0494

DEC
VAX 11/780

CALL
CARL ROGERS
606-223-4444

FOR SALE OR LEASE

3276-2's
3278-2's
3287-2's

LARGE QUANTITIES
IMMEDIATE AVAILABILITIES
Call 214/258-0541!

METROPLEX COMPUTER
COMPANY, INC.
320 Decker Drive • Suite 180
Irving, TX 75062
MEMBER CCA
TWX 910 860-9285

IPS Computer Marketing Corp.

MACK CENTRE II MACK CENTRE DR. PARAMUS, N.J. 07652

WANTED 3032 4 or 6 MB CPU Call: George Hellborn	FOR 3033, 3032 BUY SELL LEASE Call: George Hellborn	AVAILABLE 3033 S8 Lease November 1, 1981	3031 Sale or Lease April Delivery Annette Rosen or Jon Pelenez	MEMORY Available For 3031, 3032 3168, 3158 CALL: FRANK CAMPAGNA
AVAILABLE 3803-1's 3420-3's 3420-5's 3420-7's April Delivery	AVAILABLE 3803-2 3420-8's 3420-6's 3420-4's Immediate Delivery	CANADA 3420-6's 3803-2's AVAILABLE Call Frank Campagna	AVAILABLE 125/135/145 CPU's 3340 A2, 3340 B2 3344 B2	TRADE WANT 3350 A2 3350 B2 FOR 3420-4's OR 3420-6's
WANTED 3350-A2/B2/C2 A2F/B2F April/May Delivery	AVAILABLE 3333-11 3333-1 3330-11 3330-1 Immediate Delivery	WANTED 3420-5/7/8 single density dual density	AVAILABLE 3158 U34 May 3158K June For Lease	Wanted 3420-8's S.D. or D.D. 3803-2's

TELEPHONE:(201) 262-9500 Telex:642-197 IPSPARA

IBM SYSTEM 3 MODEL 10
FOR SALE

5410-A14 CPU 16K
5203-3 Printer 300 LPM
5424-A1 MFCU
(2) 5444-A2 Disk Storage

Available June 1

CONTACT:
Paul F. Maier,
Data Processing Manager
Hovnanian Enterprises, Inc.
10 Highway 35
Red Bank, N.J. 07701
201-747-7800

Burroughs B800
FOR SALE

Includes fixed disk, 100 TPI disk cartridge, 350 line per minute printer and full blown memory 128K. Reusable disks available.
Sundance Photo, Inc., Industrial Drive, Jackson, WI 53037 (414) 677-2233.

FOR SALE

(4)	3330-011	now
(6)	3330-011	4-30-81
(3)	3330-011 w/8150	4-30-81
(3)	3330-011	5-31-81
(2)	3830-002 w/2150,8170	5-31-81
(2)	3830-002 w/2150,2151,6111,8170	5-31-81
(4)	3333-011 w/8150	5-31-81
	3158-K w/ (5) channels	now

C.C. ELDERS

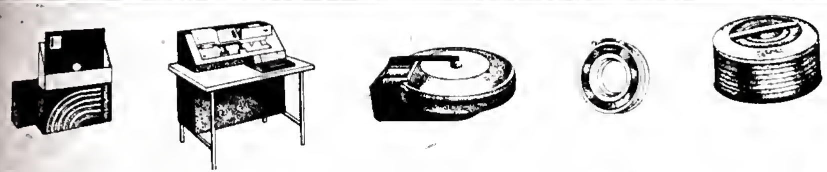
DAC Buys Rental Credit Equipment
Call or Write

DATA AUTOMATION CO., INC.

4858 Cash Road
Dallas, Texas 75247
214-637-6570
TWX-910-861-4240

CDLA Member Computer Dealers & Lessors Association

IBM UNIT RECORD EQUIPMENT
DISK PACKS, DATA MODULES, MAG. TAPE, DISKETTES



SALE OR LEASE

026	084	129	548	2316
029	085	514	555	3336(1)
082	087	519	3742	3336(11)
083	088	526	360/20	3348(70)
				Cartridges

Highest prices paid for used packs & machines.

Thomas Computer Corporation
600 North McClurg Court, Chicago, IL 60611
800•621-3906 Ill. 312-944-1401

Autorized Distributor
Memorex
CDC
3M
BASF

4341 MODEL GROUP 2
JUNE, 1981
SEPTEMBER, 1981

NF COMPUTER
SALES & LEASING CORP.
CDLA
Oak Brook, IL
312-920-8181
Minneapolis, MN
612-854-1018

DPD
PERIPHERALS

3330 3410
3340 3411
3350 3420

BUY • SELL • LEASE

COMPUTER
BROKERS INC.
2978 SHELBY ST.
MEMPHIS, TENNESSEE

901-372-2622

GSD
SYSTEMS

3 32
34 38

BUY • SELL • LEASE

For Sale

MICRODATA EQUIPMENT

(3) 10MGB disks
Cabinet without power,
which may be used for
up to (2) 10MGB disks.

Contact W.R. Kinzel
Good Supply & Equipment Co.
905 Miami St.
Akron, Ohio 44311

DIEBOLD
COMPUTER LEASING
BUY•SELL•LEASE

ALL CPU's & PERIPHERALS
360 303X
370 4300 Series

IBM
CARD READERS & PUNCHES
PRINTERS
CONTROLLERS
AVAILABLE NOW

CALL **DIEBOLD**
800-631-1602 201-569-3838
TWX 710-991-9733

177 North Dean Street, Englewood, New Jersey 07631
Member: Computer Lessors Association
and Computer Dealers Association

MAKE YOUR DOLLARS COUNT
CALL THE ORIGINAL AND ONLY
minicomputer exchange inc.

Nova 3 256KB Mos Memory with on board ERCC, one year warranty	$2,700
Eclipse 8440 16KB Core Memory	$ 395
6052 CRT's	$1,250
DEC PDP 11/23; 128KB Memory; DLV11J	$6,300

STOCK:
Nova 800, 1200, 2, 3, 4
Eclipse S130, S140, C330
Most Memories, Options, Peripherals

Call for the configuration that fits your needs.
DATA GENERAL * DEC * H.P.

SELLERS: List your DEC equipment with us.
Many buyers waiting.

CALL 800-538-1740 (outside CA) or 408-733-4400**

DEC
PDP-11/70
Available

Call Carl Rogers
606-278-0411

For Sale
3803-2
(8) 3420-6/6425
JMS Computer Associates
7 Roswell St.
Alpharetta, GA 30201
Greg Miesse
404/475-1000

For Sale
(16) 3278-2 Terminals
Data Entry Keyboards
(1) 3274-1C Control Unit
16 Terminal Capacity

Contact M. Rayno
215/674-4900

For Sale By Owner
IBM System 3 Model 8
CPU 5408, 32K
Disk Drive 5444
(2 drives available —
(1) removable 2.5 mb, 1 fixed)
Printer 5203 (300 LPM)
Printer Keyboard 5471
Data Station 3741
Contact Robert Genett
206/223-6594

WANTED TO BUY
IBM 3340/A2 DASD
IBM 3340/B2 DASD
IBM 3344/B2 DASD
IBM 3420/6 Tape Drives
IBM 3330/3333/11 DASD
Please Call: (312) 943-3770
Forsythe/McArthur
Associates, Inc.
919 North Michigan Avenue
Chicago, Illinois 60611

3830-II
2150, 2151, 6111, 8170, 8171
ANY TERM LEASE

6 Mo. $900-12 Mo. $750
24 Mo. $400
SALE - $10,000

Call
Charlie Albright
212-482-8840

FOR SALE
WANG
MVP, VP, VS Systems
Available **NOW!**

We buy WPS Systems, too.

(617) 437-1100

AMERICAN USED COMPUTER
P.O. Box 68 Kenmore Station Boston MA 02215

Immediate Delivery
DEC 11/23
with
(2) RL01's
5MB drives
VT100 CRT
128K Memory
RT11 (A support)
$18,000
RAL Minicomputer
Consultants Inc.
5N812 Pearson Lane
St. Charles, ILL 60174
312/584-6622

DEC
RP04-AA (2)
RH70 (1)
Massbus Cables 25' (2)
Disk Packs (5)
Maintained & Deinstalled
by DEC
DEC list $70K —
sell for $20K

(970) 789-3950

Available for Purchase
Immediately with Possession Date to be on Sept. 1, 1981.

Request Bids on 3031, model 4 or 3031 model 2 computer.

For information contact Robert E. Kinch, Computer Services, Forsyth Memorial Hospital, 3333 Silas Creek Pkwy., Winston-Salem, N.C. 27103.

Phone: 919/773-3930.

WANG
800-526-0652

In New Jersey
201-386-9840

BUY AND SELL
Second User
2200T, VP, MVP, VS
AND
WORD PROCESSORS

40/4, SDC
CRT, KB,
Printer, PED

Save 60% Off List

Teletype List $9,678

Buy for only $5799

Preston Leasing
714/292-8978

WANT TO BUY
DECISION DATA
8010-11
(new or used)
Contact:
Len Mueller
Cummins-Allison Corp.
1825 Glenview Road
Glenview, Il. 60025
(312) 724-8010

NEW DEC EQUIPMENT FOR SALE BY OWNER

FP11-C Floating Point Processor	$5,700.00
RSX 11M License Only	$2,700.00

Immediate Delivery
Phone Jim Simons
A/C 713-774-9761

DEC LSI-11 Components
Dependable service at discount prices
Domestic and Export

Mini Computer
Suppliers, Inc.
25 Chatham Rd., Summit, N.J. 07901
Since 1973
(201) 277-6150 Telex 13-6476

For Sale
- * **DEC PDP-8**
  CPU & 2 terminals
  $12,000
- * **Access System 60**
  800 card capacity
  Includes coder,
  selector and stands.
  Large card type.
  Prime working order.
  $8000

617/749-8570

For Sale —
IBM SYS 32-B32 16K MEM, 5 MB Disk, 155 LPM IBM 3741 Mod 1, Features 4002, 5901, 6123. All under IBM Maint. — Available approx. 6/1/81. **Don Beckley — Tagsons Papers, Inc. P.O. Box 1989, Albany, NY 12201.**
518/462-0200.

WANTED
Mini-computer System for Time Sharing Applications

Must be fully operational.

Call John at
212/986-4448
Telecomputing Systems Corp.

For Sale By Owner
OPSCAN 17
Optical Mark Reader
Manufactured by
National Computer Systems
Brand New
DEC Compatible interface
Current loop or
EIA RS232-C Input at 300 baud
Contact
Educational Reading Service
Roger Schatel
201/529-2206

DATAPOINT REBATE
Buy your computer direct from Datapoint and qualify for a rebate from us.

Call for details.

217/352-0909

Computer Acquisition
Specialists, Inc.
201 W. Springfield Ave.
Champaign, IL 61820

For Sale
BURROUGHS B80 COMPUTER
Disk drive,
disk cartridges.

60KB memory,
Console Printer,
Self Scan screen.

301/757-3900

RM03-AA's
$12,500
RP06-BA's
$26,000
NPI
National Peripherals, Inc.
312/236-8920

For Sale or Lease
(6) 3420-6
Dual Density with 3803-2
3811/3211 Printer System
LaSalle Computer Corp.
200 W. Monroe, Ste. 1607
Chicago, IL 60606
Contact Chuck Gately
312/332-3320

370/158-3
Any Term Lease

ISC Available

May 1 Delivery

Call:

Charlie Albright

212-482-8840

FOR SALE
DEC
MEMORY

MS11LD 256KB
MS11LB 128KB

714-632-6986

WANT TO BUY
WORDSTREAM/ GENESIS
G77
TERMINALS

HELLEMS ASSOCIATES
301-647-6470

For Sale
Univac Equipment
One UTS 700 Computer
64 K
5440 Disk 2.5 MB
300 Line Printer
300 P.M. 80 col.
card reader
One 1710 VIP Key Punch
One 1610 VIP Key Punch
Phone:
Sawhill Tubular
Paul Mitchell
412-347-7771
Ext. 546

Buy·Sell·Lease·Trade
SERIES/1
•STEVE HOUGH
DICK GEYER (615) 383-8703
•DICK TWARDOWSKI (713) 675-7551

PEARL
EQUIPMENT COMPANY, INC. 4717 Centennial Blvd.
P.O. Box 24026
Nashville, TN 37202

NEW
RM03
Disk Drive
$14,995
M.E. Congdon (203) 728-6777

IBM 3033
U8 to U12 memory
Available 6-1-81
12 mo. — $13,950/mo
18 mo. — $11,950/mo
24 mo. — $ 9,950/mo.
ECMI
Ken Douglas
404/394-8080

For Sale
NEW DATAPOINT 1500's
(1) Datapoint 160 CPS
Matrix Printer
(1) TI 810R0 Printer
Call
214/698-1113

For Sale
DATAPOINT 4540 SYSTEM
56K Internal Memory
50 megabyte disk storage
Contact John Finch
401/863-8354
Harlcomp Inc.
P.O. Box 9627
Providence, R.I. 02940

ADAGE 4250
Graphic Display Stations
1— CU4201 Channel Unit
1— CS4250 Control Station
2— DS4250 Display Station

All units in excellent condition and fully covered by maintenance agreement with Adage Corp.

Call (313) 553-1000
Ext 285

FOR SALE OR LEASE
IBM 3420/3 Dual Density
Tapes Immediate
IBM 4341/L Processor
Immediate
IBM 4341/M2 Processor 09/81
IBM 3350/A2 Disk Drive 05/81
Please Call: (312) 943-3770
Forsythe/McArthur
Associates, Inc.
919 North Michigan Avenue
Chicago, Illinois 60611

VAX*

IN STOCK!

NEW
&
USED

11/750
11/780

- Immediate Delivery
- Custom Configurations
- Software Available

"THE VAX SPECIALISTS"

800-854-0350
(IN CALIF. 714 - 632-6986)

DATALEASE

2770 E. Regal Park Drive
Anaheim, CA 92806
TLX 692439

*Trademark of Digital Equipment Corporation

COMPUCOM

DEC PDP11 EQUIPMENT AVAILABLE

SYSTEMS

11/34A RSTS	$35,000.
11/780	Call
11/750	Call
11/70 RSX	125,000.
11/70 RSTS	125,000.
11/80 RSX	62,500.
11/45	35,000.

PROCESSORS

11/70	80,000.
11/80	25,000.
11/45	22,000.
11/40	7,000.
11/34A	Call
11/23	Call
11/20	750.

DISK

RM03	14,850.
RP06-AA	29,000.
RP08-BA	33,000.
RP03	4,900.
RPR02	2,500.
RK05	1,950.

CONTROLS

RH11	4,000.
RH70	4,000.
RK11-C	1,800.
RP11	2,500.
Dual Port	4,500.

TAPE

TWU77	30,000.
TWE16	19,500.
TU45	10,000.
TMA11-EA	6,500.
TU10	4,000.

TERMINALS

VT100, New	1,700.
VT61	800.
VT50	500.
LA36	950.
MOD 40	1,000.

COMMUNICATIONS

DZ11-B	
DL11-W	$ 1,950.
DU11-DA	690.
DQ11-DA	1,250.
DL11-A	1,000.
	400.

PRINTERS

1403-N1 & DEC Ctrl.	12,500.
LP11 Ctrl.	500.
Calcom 563	750.
Calcom 565	1,500.

DATA PRODUCTS PRINTERS & CTRL.

200 LPM Matrix	3,625.
300 LPM Band	6,100
600 LPM Band	8,750.
900 LPM Band	13,625.
300 LPM Drum	9,400.
600 LPM Drum	12,500.
900 LPM Drum	18,750.
1500 LPM Band	34,000.

MEMORY

MK11-C 128KW	8,000.
MF11-UR	1,725.
MM11-F	100.
MM11-E	100.
ME11-L	100.
MF11-UP	1,000.
MM11-U	750.

OPTIONS

FP11-B	6,000.
DB11-A	800.
DT03-FM	4,000.
H967	500.
DC11-A	25.
BM847-Y	100.
KE11-F	1,225.
KE11-E	1,000.
CR11	2,000.
DB11-A	800.
DB11-B	800.
DR11-C	400.
H861-C	550.
H980-CA	1,500.
KE11-A	50.
KT11-D	1,000.
BM873-YA	100.
M9301-YF	500.

DISK PACKS

RK05	$ 25.
RP03	272.
RP02	272.
RM02	519.
RM03	519.
RM05	1,262.
RP04	492.
RP06	695.

COMPUCOM INC.
3402 OAKCLIFF RD., B-7 ATLANTA, GEORGIA 30340
(404) 452-1090

Wanted to Buy

3505
3525

With or Without
Print Feature

COMDISCO

Call Your Local Office
or Karen Johns

312-698-3000

WANTED

1416 and 5203-3
Print Trains

Any condition
We do repairs
and conversions

COMPU-ACT CO.

Gateway Executive Center
200 State Rd. 52, Ste. 204
Port Richey, FL 33568

813/863-2461

LIMITED OFFER

UNIX*-V7 11/23 RL02 Systems
15% Discount on DEC Hardware
Installation and Warranty Included
Licensed by Western Electric Co., Inc.

*UNIX is a trademark of Bell Laboratories.

uniq Computer Corporation
(312) 879-1566
28 S. Water Street • Batavia, IL 60510

IDS international data services inc.

DEC SYSTEMS

PDP 11/70's,
11/34's, 11/04's,
11/03's & Peripherals

BUY & SELL

(408) 738-3368
telex 345 592

1020 Stewart Drive
Sunnyvale, CA 94086

For Sale By Owner

TELEX/ITEL EQUIPMENT

- (4) 6830 Disk Controllers
- (21) 6316 100 MB Disk Drives
- (1) 6803 Tape Controller
- (8) 6420-7 Dual Density Tape Drives
- (1) 5403 Printer
- (1) 5821 Reader Punch Printer Controller
- (1) 6721 Printer

Call Manager of
Computer Operations
Murray Wankel
Home Savings and Loan Assoc.
P.O. Box 3992
N. Hollywood, CA 91609
213/764-0025, X434

DEC

VAX 11/780
FOR SALE
2M bytes of memory

RP06 Disk Drive, TE16-AE Tape Drive
LA120 System Console, Floating Pt. Processor,
DZ11-A Terminal Interface, Battery Backup,
DUP11, DMC11-AL, DMC11-MD,

VMS 2., Fortran 4 Plus
Call: Scott Wells
Duke University
Medical Center,
Box 3181
Durham, N.C. 27710
919-684-6804

3270'S

Immediately Available

PRICED TO SELL

Controllers & Printers Available

First Computer Corp.
4660 Beechnut
Houston, TX 77096
(713) 666-3033

IBM

S/3-15D

SERIES/1

Sell
Buy
Lease

Call Collect:
404-252-7480

5110
S/32
S/34

DATAMARC
6065 Roswell Rd.
Suite 320
Atlanta, GA. 30328

For sale
or lease

System 3 model 12
C-20, 96K Dual Prog.
3340-c2 — 5471-1
5203-03 — 3741-1
1442-6 — 3277-2

3344-B2 Serial #84134

Computer Products Co.
513-721-3399

DEC®

OR EQUIVALENT

HAVE IT YOUR WAY

BUY-SELL-LEASE

Check these savings on equivalents

OUR PART #	DEC PART #	DESCRIPTION	DEC LIST	OUR LIST
WJM02	RJM02	80 MB DISK AND CONTROLLER	25700	15500
WWM03	RWM03	80 MB DISK AND CONTROLLER	26800	17500
WM02/03	RM02/03	80 MB DISK (SLAVE)	19300	8500
WJP06	RWP06	200 MB DISK AND CONTROLLER	44000	21500
WWP06	RWP06	200 MB DISK AND CONTROLLER	44000	23500
WP06	RP06	200 MB DISK (SLAVE)	34000	14995
WJM04	RJM04	300 MB DISK AND CONTROLLER	N/A	23500
WWM05	RWM05	300 MB DISK AND CONTROLLER	N/A	25500
WM04-05	RM04-05	300 MB DISK (SLAVE)	N/A	16500
WTJ45	TJE16	45 IPS TAPE AND CONTROLLER	20200	8100
WTJ75	TJU45	75 IPS TAPE AND CONTROLLER	24600	10000
WTJ125	TJU77	125 IPS TAPE AND CONTROLLER	30000	11990
WH960	H960	CABINET FOR TAPE DRIVES	1800	1500
WMS11-LB	MS11-LB	128KB MOS MEMORY	4300	2100
WMS11-LD	MS11-LD	256KB MOS MEMORY	6400	4250
WDD11-CK	DD11-CK	FOUR SLOT BACKPLANE	440	350
WDD11-DK	DD11-DK	NINE SLOT BACKPLANE	880	750
WDD11-PK	DD11-PK	NINE SLOT PROC. BACKPLANE	880	750
WM9312	M9312	BOOT/DIAGNOSTIC/TERMINATOR	880	750
WM9302	M9302	UNIBUS TERMINATOR	110	100
WDL11-W	DL11-W	SERIAL INTERFACE	820	700
WLP11	LP11	LINE PRINTER CONTROLLER	770	650

COMMISSIONS PAID ON SALES

(408) 732-4523

WEX

West Coast
Computer
Exchange Inc.
248 Sobrante Way, Sunnyvale, CA 94086

buy sell swap

buy sell swap

ATTN: SERIES/1 USERS
FOR SALE OR LEASE

4955-D&E	96K-256K Memory
4952-B	32K-128K Memory
4962-2	9.2 MB Disk Drive
4962-4	13.7 MB Disk Drive
4963-64A	63 MB Disk Drive
4966-1	Diskette Magazine Unit
4978-1	Display Station
4979-1	Display Station
4997-A&B	Rack Enclosure

All equipment guaranteed for IBM M/A

Call or write GARY NORRIS

DAC Buys Rental Credit Equipment
Call or Write

DATA AUTOMATION CO., INC.

4858 Cash Road
Dallas, Texas 75247
214-637-6570
TWX-910-861-4240

CDLA Member Computer Dealers & Lessors Association

BIDS & PROPOSALS

Request for Proposal for the purchase and installation of a uniform computerized accounting system to be installed and utilized by all public colleges and universities in W. Virginia. The proposals are available from purchasing division.

Contact Kathy Klein, 304/348-7837.

Proposal opening will be May 7, 1981 at 3 p.m.

Request for Proposals

Edison State Community College will accept proposals delivered by May 11, 1981 for sale and/or lease to the college of new or used peripheral equipment for an IBM 370/125. Separate proposals for maintenance. For complete specifications write to: John L. Cook, Director of Computer Services, Edison State Community College, Piqua, Ohio 45356. Telephone: (513) 778-8600.

BUSINESS OPPORTUNITIES

ACQUISITIONS WANTED

Public data processing firm seeks acquisitions with sales in the $200,000 to $2,000,000 range in the following areas:

- Software/Systems houses
- IBM timesharing/service bureau firms
- Professional services firms
- DEC PDP-11 turn-key systems

We are principals —

Reply in confidence to:
C.W. Box 2545
375 Cochituate Rd., Box 880
Framingham, Mass. 01701

SEEKING ACQUISITIONS

Publicly held systems house seeks acquisitions of software companies with large vertical market potential. Cash or stock.

Write:
C.W. Box 2549
375 Cochituate Rd., Box 880
Framingham, MA 01701

COMPUTERWORLD

SOFTWARE WANTED

RFP

South Florida manufacturer and distributor with over $30 million annual sales is issuing an RFP for the following software modules: Payroll/Personnel, Accounts Payable, General Ledger/Financial Reporting, Budgeting, Fixed Asset Mgt., Cost Accounting, Purchasing, Warehouse Support, Manufacturing, Retail Store Support and Serial Number Control. All packages will run on a medium sized Burroughs System. Interested parties should submit their latest financial statements and company background by May 15. Potential Bidders will be screened and qualified bidders invited to submit formal proposal. Selected bidders will be expected to post a bid bond and upon contract signature a performance bond.

Address all responses to:

MAS Department
Alexander Grant & Company
1000 Brickell Avenue
Miami, FL 33131

SOFTWARE WANTED

Electrical contractor needs accounts receivable software to interface with IBM S/34 CMAS accounting package. Software package should include customer listing, aging, posting to G/L, print statements, tie to job costing, and retainage without aging. Application must be well documented, include source and have established track record.

Please send information to:

D/P Manager
The Lewis Companies
5484 S. 103rd E. Ave
Tulsa, Oklahoma
74145

Computerworld's classifieds work. (That's why you see so many of them.)

COMPUTERWORLD

WANTED
MAIL ORDER Software System & Source Code

INCLUDING AT LEAST:
- ORDER ENTRY
- INVOICE/PICKING LIST PRINTING
- BACKORDER HANDLING
- DROP SHIP HANDLING
- CHARGE CARD ACCEPTANCE
- PRICING BASED ON ORDER SOURCE

Must be designed *specifically* to run on **IBM SYS/38.**

CONTACT: MR. BUFFER
(216) 798-9565

SOFTWARE FOR SALE

DRS for 11 & VAX

Proven!
The ∧ DBMS/PRODUCTIVITY TOOL

- For DEC 11 and VAX (Native Mode Too!)
- In Use For 10 Years . . . Over 150 Sites
- Technology Leader in Data Base Systems

Call For A *FREE* **BRIEFING BOOK**

AMERICAN USED SOFTWARE COMPANY
P.O. Box 68, Kenmore Station, Boston, MA 02215 (617) 437-7600
DRS is a product of Advanced Data Management

TI 990 FINANCIAL CONTROL SOFTWARE

- COBOL • Interactive
- Multi-terminal • Flexible
- Payables • Receivables
- General Ledger • Payroll
- Order Processing
- Inventory Control

Great Lakes Information System, LTD.
5 Research Drive, Ann Arbor, MI 48103
(313) 663-6402

SERIES/1
DATA ENTRY SYSTEM

Data Entry using IBM IDES II is now available on EDX operating systems utilizing 4978 or 3101 terminals. Our product is powerful enough to replace CMC/PERTEC*, ENTREX*, FOUR PHASE*, CADE* key disk system in a single partition program.

Demonstration and trial installation available immediately. Direct inquiries to:

Datronics Systems, Inc.
940 Springcreek Pkwy.
Plano, TX 75023
214/422-7711

FOUR-PHASE SOFTWARE

- — Time & Attendance
- — Asynchronous Interface
- — Radiology Index
- — Hospital Applications
- — Contract Programming
- — Software Conversion

Call or Write

Custom Programming Group, Inc.
108 S. Valley Rd
Paoli, Pa 19301
(215) 396-3886

SYSTEM/34 SOFTWARE
M.D. 34
MEDICAL BILLING SYSTEM

Simple Installation, On-Line Interactive, Menu Driven, Source Code Included.

Family or Individual Billing, Insurance Form Processing, Practice Analysis Reporting, Aging and Delinquency Reports

Computer Guidance, Inc.
120 Maple Street
Springfield, MA 01103
413-781-1144

Two distinguished products for PDP-11 and VAX users

INTAC™ **Interactive Data Base Management**

INTAC is a new concept for data storage and retrieval that features an easy-to-use question and answer format, built-in edit rules, multi-key ISAM data access, interactive inquiry, and a unique report generator.

MAPS™ **Financial Modeling**

MAPS, recognized worldwide for over five years as a leader in financial modeling and reporting, is used to construct budgets, financial forecasts, consolidations and "what if" analyses.

Call us at
(415) 856-1100

ross systems
incorporated

1900 Embarcadero Road • Suite 208 • Palo Alto, California 94303

Elegant Software

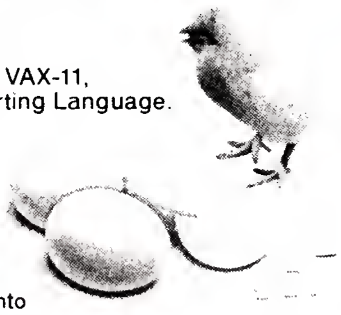
For IBM S/34 & S/38 Computers

- Mailing List
- Accounts Receivable
- Inventory Management
- Order Processing
- Sales Analysis
- General Ledger
- Accounts Payable
- Payroll/Personnel
- Financial Reporting
- Job Cost Accounting
- Fixed Assets
- Word Processing

J.D. Edwards
& COMPANY
Architects and Builders of Information Systems

Two Denver Technological Center
Englewood, Colorado 80111
303/773-3732

How to count your chickens before they hatch.



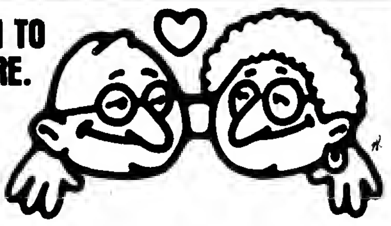
All you need is a DEC PDP-11 with RSTS or a VAX-11, and FINAR—the Financial Analysis and Reporting Language.

- *Budgets*
- *Cash flow*
- *Planning*
- *Project evaluation*
- *Forecasts*
- *Consolidation*

FINAR SYSTEMS
6000 E. Evans, Suite 2-300, Denver, CO 80222

(303) 758-7561 • Denver
(212) 222-2784 • New York
(312) 876-1081 • Chicago
(416) 245-8473 • Toronto
(713) 960-0848 • Houston
(415) 956-1178 • San Francisco

INTRODUCE YOUR RSX SYSTEM TO PASCAL ACCOUNTING SOFTWARE.



YOU'LL LIKE THE MATCH.

Accounts Receivable, Accounts Payable, General Ledger, Order Entry. $2,000/system for RSX. $1,500/system for RT-11.

THETA BUSINESS SYSTEMS
1110 Sonora Ave., #106
Glendale, CA 91201 (213) 242-7981

NEW FOR SYSTEM/34

GENERATE ON-LINE F/M PRDGRAMS – DN-LINE ADD/CHG/DEL/INQ
58 FIELDS, REPDRT DUTPUT

S/34 DDCUMENTATION AND ANALYSIS AID SYSTEM

OTHER SYSTEMS FDR S/3 AND S/34 – A/P, G/L, A/R, P/R, DTHER

(EXTENSIVE DOCUMENTATION, RPG II SDURCE PROVIDED)

BANCROFT COMPUTER SYSTEMS, INC. (318) 388-2236
P. O. Box 1533 West Monroe, Louisiana 71291

---

the IBM Solution
HASPBOX™

SOFTWARE RESULTS CORPORATION

the CDC Solution
UT200BOX™

RSTS•VAX•RSX!

DATA COMMUNICATIONS

- INSTALLATIONS THROUGHOUT NORTH AMERICA AND EUROPE
- FRONT END PROCESSOR-BASED FOR LOW OVERHEAD
- FULL LINE UTILIZATION FOR HI-THRUPUT (UP TO 19.2 KB)
- USER INTERFACE DESIGNED FOR RELIABILITY AND SIMPLICITY

614 421 2094 COLUMBUS OH 43212 USA TWX 810 482 1631

- RPG/RPG II to COBOL
- COBOL to COBOL
- FORTRAN to FORTRAN
- NEAT/3 to COBOL
- DIBOL to COBOL

Converting is easy with

DASD™

- Proven software
- Experienced personnel
- Nationwide offices

CHECK WITH US TODAY

DASD Corporation
Corporate Services Center
Dept. 130/9045 North Deerwood Dr.
Milwaukee, WI 53223
(414) 355-3405

SYSTEM/34 SYSTEM/3

Standardize field names in RPG II programs. Implement data base techniques 10 times faster than IBM's package!

Inquire now to receive free literature.

HAWKEYE
P.O. Box 1194-C1
Reseda, CA 91335
(213) 997-6894

TEXT PROCESSING FOR IBM 370

or any other
COBOL based
computer
DOCU/TOOL $480

for imformation
contact:

Delphi Data Systems
7716 Morgan Ave. S.
Minneapolis, MN 55423
612-861-4555

Ask About DD*
Compress Too

HASP* for PDP-11 and VAX

flexible communications link to

IBM•CDC•DEC•ETC

BATCH, DISTRIBUTED PROCESSING
AUTODIAL, SPECIAL APPLICATIONS

Low Price • Low Overhead
Free Trial

datanex
Datanex, Inc., P.O. Box 30008
Eugene, Oregon 97403 (503) 687-2520

$^{11}/_{23}$+RSX+MASS-11=

MULTIUSER WORD PROCESSING

Convince yourself!
CALL
312-882-0111

Microsystems Engineering Corp.
2400 Hassell Rd., Ste. 410
Hoffman Estates, IL 60195

™$^{11}/_{23}$ & RSX DIG. EQUIP. CORP.
™MASS-11—MICROSYSTEMS ENG. CORP.

FINANCIAL HEADACHES?

℞ **FIPS FAADS**

FIPS (Financial Information Processing System)
***Interactive A/R, A/P, Payroll, G/L (w/Consolidation & O.H. Budget), built-in financial reporter generator

FAADS (Fixed Asset Accounting & Depreciation System)
***Meets G.A.A.P., multi-company processing & depreciation methods, maintains tax AND corporate books

The sure cure for your financial computing and reporting problems . . .

CRC has been writing DEC RSTS/E software since 1972

COMPUTER RESOURCES

5680 South Syracuse Circle Suite 118 Englewood, CO 80111 303-771-8930

SYSTEM/34 SOFTWARE

Paratext Word Processing $500

Full Service Text Editor
Enter, Edit, Store Text
Automatic Centering
Automatic Justification
3 Print Programs
Individual Forms Design

Documentation
Contracts
Memos
Sales Brochures
Business Letters
Marketing Campaigns

General Ledger $500

On-line journal entries
Completely interactive
Easy correction of errors
Concurrent periods
Fast throughput
Designed by accountants

Consolidated reports
Comparative reports
Customize P&L statement
Customize balance sheet
Flexible chart of accounts
Many report options

For documentation, call Jeffrey Papows (617) 546-3413
Para Research, Rockport, Massachusetts 01966

Turn your PDP-11 into a powerful word processing tool.

With the WP Saturn you can add powerful word processing to your PDP-11, LSI-11, or Vax System, without the cost of a stand-alone system.

WP's ASCII Format interfaces to standard DEC files.

Assembler Language provides maximum speed and efficiency.

User Friendly Prompting helps you master word processing with minimal training.

Extensive List Processing: Forms, prompted data entry and sort/select; plus flexible merging of lists and documents.

For Information Call . . .
800-328-6145
Saturn Systems, Inc.

software for sale

IBM 5120 to System/34

Basic Conversion program

Creates System/34 Basic language source code from IBM 5120 Basic Source.

Call or write
Jedark Corp.
4040-C
Sorrento Valley Blvd.
San Diego, CA 92121
714/455-6235

software for sale

SYSTEM 34 SOFTWARE

DMS
DISKETTE MANAGEMENT SYSTEM

Automatically keeps track of diskette usage/contents. Eliminates cataloging to locate files/libraries on diskette.

DBSLIB - PROGRAM LIBRARIAN - DATA DICTIONARY

Automatically provides complete cross reference from field to job. Online inquiry at any level (Field-File-Program-Job-System).

DBSAFE - AUTHORIZED JOB/ PROGRAM FACILITY

Prevents unauthorized execution at job/ program level via userid. Complete security without special menus or sign-on.

D/B SERVICES
218 WASHINGTON STREET
INGLESIDE, ILLINOIS 60041
(312) 587-2008

software for sale

WANG VS

RPG II

Business Applications:

- General Ledger
- Accounts Receivable
- Accounts Payable
- Sales Analysis
- Payroll
- Professional Time Accounting
- Law Firm Management System

- Cross Licensing Available -

MILLER-LUCAS COMPANY
4811 N. Sterling Avenue
Peoria, IL 61615
(309) 692-5640

TIME & SERVICES

MEMORY & COMPUTER REPAIRS

ANY MANUFACTURER'S MEMORIES
CORE — SEMI
DEC® — DATA GENERAL
COMPLETE CPU'S AND MEMORIES

T D C

THREE DELTA CORP
1038 Kiel Court, Sunnyvale, CA 94086
(408) 734-2680
TWX-910 339-9511

COMPUTER TIME & TIMESHARING

- We are brokers
- We specialize in IBM systems.

Contact John Rudder at
Computer Reserves, Inc.
(212) 599-0770
(201) 676-1881

CURTISS WRIGHT Computer Services

370/158–3
VS1–CMS–ROSCOE–DOS
REMOTE JOB ENTRY
INTERACTIVE COMPUTING
TURNKEY SYSTEMS
DATAPOINT PROGRAMMING
CONTACT JOE BARRETT
(201) 777--3454
15 MINUTES FROM LINCOLN TUNNEL
ONE PASSAIC STREET
WOOD-RIDGE, N.J. 07075

Computer Services in Los Angeles

2-Magnuson
M80/32's-6 meg
1-IBM 370/135-1/2 meg
VM370/CMS-OS VS1
DOS/VS REL. 34,
CICS-POWER
DOS/VSE REL. 2

Local and remote processing.

Contact Bill Campbell
213/232-4141 or
213/882-5954

MEMORY REPAIRS

ALL MANUFACTURERS
DEC, NOVA, OR ANY OTHER

- 10 Day Turnaround.
- 90 Day Warranty.
- Core or Semi. Stack Repairs.
- Reasonable Prices (From $90).
- Low Flat Fees Available for Oems, Large Users and Repair Labs. 100% Burn-in.

DIGITAL DATA SYSTEMS, INC.
1396 N W 65 Terr., Plantation, FL 33313
Florida (305) 792-3290
Boston (617) 491-3859
Chicago (312) 475-4435
Philadelphia (215) 272-7442
OUR 8TH YEAR OF SERVICE

OIL & GAS

API GRAVITY/TEMPERATURE CORRECTION MODULE

Written in Ansi COBOL, this program can be used as a stand-alone "call" module or compiled into other programs. Conforms to new API standard 2540, 1980.

NRG SYSTEMS

514 Milam Building
San Antonio, Texas 78205
512 * 271-3885

DEC TIMESHARING SERVICES

VAX-11/780 - VMS
PDP-11/70 - RSTS/E

Located in San Francisco
—Nationwide Network—
—Public and Private—
BASIC, FORTRAN,
Software Consulting Services

DALGETY, INC.
DALGETY DATASYSTEMS
1 Maritime Plaza
San Francisco, CA 94111
(415) 788-4016

COMPUTER TIME AVAILABLE

4341 4 MEG
DOS/VSE, VS1,
VM/370, CICS SNA,
EP Communications

Contact:
Lee Constantine
(617) 449-5310

UNIVAC 1100/60 COMPUTER TIME AVAILABLE

At extremely attractive rates
Most Univac software available
including MAPPER
Time available on all shifts.

Contact J. Starzec
301/864-9200
SBD Computer Services Corp.
4744 Baltimore Ave.
Hyattsville, MD 20781

IBM 370-145

First Shift and Weekends
MICR 1419 Available

FBC, Inc.
Benson Road
Middlebury, CT 06749

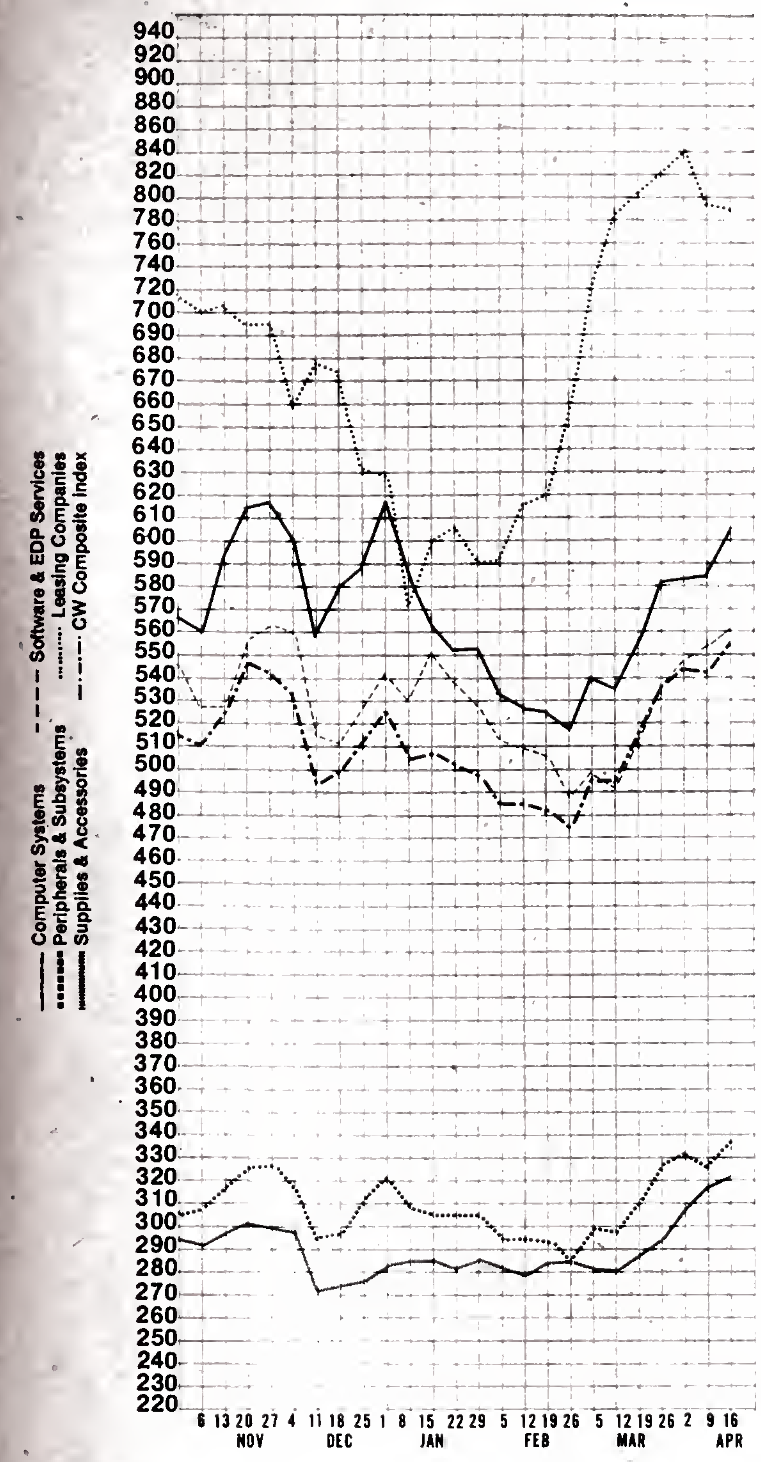
Contact
Ralph Marcucio
(203) 758-2452

ADVERTISERS' INDEX

Advanced Systems	49
American Airlines Freights System	ID/18
American Computer Group	33
American Key Data	ID/20
American Peripherals Exchange	70
American Terminal Leasing	85
Applied Data Research	3
Applied Software	58
Arkay Computer Inc.	ID/15
Automated Quill, Inc.	8
John Beall	65
Billings Computer	ID/8
Blythe Eastman	26
The Boeing Co./Recruitment	34
Boole & Babbage	38
Alex Brown, Inc.	80
M. Bryce & Associates	57
California Datalease	34, 76
Capex Corp.	7
David Jamison Carlyle Corp.	78
Cincom/Systems Software	55
ComData Corp.	61
ComDesign	63, 70
Computer Associates	5
Computer Concepts, Inc.	53
Computer Corporation of America	60
Cullinane Database Systems Inc.	23
Curtis 1000	32
CW International	ID/18
Data Access Systems	70
Datapoint Corp.	74-75
Data Systems Services	39
Dataware	58
Datum, Inc.	66
Dexel	78
Digital Engineering	81
Digital Equipment Corp./tpg/npm	ID/12-ID/13
Digital Equipment Corp./Terminals	82-83
Discount King	63
Dorlen Products	20
Eastman Kodak	ID/14-ID/15
Edutronics/McGraw Hill	22
ESP Digital Systems Corp.	54
General Datacomm	28
General Electric/AS	24
General Optronics	67
Harris Data	58
Hewlett Packard	41, 72-73
Hughes Aircraft	40
ID Systems	27
Info Builders	6
Infodata	ID/11
InfoSci	4
Innovation Data Processing	9
Input Computer	74
Intel Systems Group	10
International Data Corp.	76
International Management Services	69
Iowa Computer Resources	78
ISSCO	36
Martin Marietta Data Systems	52
McCormack & Dodge	122
Mediamatics	20
Memorex/Communications	ID/7
Micropolis	70
Mohawk Data Sciences	ID/6
MTI, Inc.	38
National Advanced Systems	79
National Software Enterprises	58
NCA	35
Newcorp	34
Okidata Corp.	30
Parker Business	63
Perkin Elmer	42-43
Qwikterm	35
Ramtek Corp.	29
Rolm Corp	62
Selenar Corp.	64
Selecterm	77
Signal Technology	14, 57
Software Intelligence Laboratory, Inc.	85
Software International	37
Spiridellis & Associates	ID/20
Storage Technology	51
Syncom	45
Tab Products	16
Tandem Computers, Inc.	44
Technology Transfer Institute	14, 15
Teleprocessing Products, Inc.	4
Televideo Systems, Inc.	48
Telex	68
Texas Instruments	ID/2-ID/3, ID/4-ID/5
Tone Software Corp.	63
TSI International	59
Vardon & Associates, Inc.	50
Verhoef Information Packages, Inc.	41
Visual Technology	21
Volker Craig	56
Wang Labs	25
Western Electric Systems	33
Westwood Assoc	871
Whitesmiths, Ltd.	78
Yourdon	17

This index is provided as an additional service. The publisher does not assume any liability for errors or ommissions.

Computerworld Stock Trading Index



COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

CW COMMUNICATIONS/INC.
Board Chairman/Publisher
Patrick J. McGovern
President
W. Walter Boyd

VP-Research Jack Edmonston
VP-Marketing Roy Einreinhofer
VP-Editorial E. Drake Lundell, Jr.
VP-Finance William P. Murphy
VP-Circulation Margaret Phelan
VP-Production Lee Vidmer

Computerworld Headquarters
375 Cochituate Road, Box 880
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

SALES
Vice President Roy Einreinhofer
Display Adv Mgr Frank Collins
Display Adv Melinda Walker
Jonna Yager
Jenny Charlesworth
Classified Adv Mgr William J. Mills

MARKETING SERVICES
Vice President Jack Edmonston
Director Research Kathryn Dinneen
Sales Promotion Peter Segal

CIRCULATION
Vice-President Margaret Phelan
Circulation Mgr Barbara Jeannetti
Service Rep Peggy Kelly
Assistant Carmela Priante

PRODUCTION
Vice President Lee Vidmer
Production Mgr Peter Holm
Supervisor Henry Fling
System Mgr Tom Pfau

Computerworld Sales Offices

Roy Einreinhofer
Vice-President/Marketing
Donald E Fagan
Vice-President/Sales
Frank Collins
Manager, Display Advertising
William J. Mills
Manager, Classified Advertising
Diana La Muraglia
Manager, International Marketing Services
COMPUTERWORLD
375 Cochituate Road
Box 880
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

BOSTON
Robert L. Ziegel
Northern Regional Director
Chris Lee
Edward P. Marecki
District Managers
Kathy Doyle
Diane Sukey
Account Coordinators
COMPUTERWORLD
375 Cochituate Road
Box 880
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

NEW YORK
Donald E. Fagan
Eastern Regional Director
Peter Senft
Michael J. Masters
District Managers
Candy Kelly
Account Executive
COMPUTERWORLD
Paramus Plaza I
140 Route 17 North
Paramus, N.J. 07652
Phone: (201) 967-1350

CHICAGO
Dave Dolber
District Manager
Jan Heaney
Account Coordinator
COMPUTERWORLD
2600 South River Road
Suite 304
Des Plaines, Ill. 60018
(312) 827-4433

LOS ANGELES
Jim Richardson
District Manager
Bob Hubbard
Account Manager
Kathie Knox
Account Coordinator
COMPUTERWORLD
3420 Ocean Park Boulevard
Suite 3020
Santa Monica, Calif. 90405
Phone: (213) 450-7181

SAN FRANCISCO
William J Healey
Western Regional Director
Barry G. Milione
Linda J Tucker
Account Managers
Ruth Gordon
Account Coordinator
COMPUTERWORLD
353 Sacramento Street
Suite 600
San Francisco, Calif. 94111
Phone: (415) 421-7330

JAPAN
Mr. Shigema Takahashi
General Manager
DEMPA/COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Phone: (03) 455-6101
Telex: J2424461

UNITED KINGDOM
Steve Burton
IDG PUBLISHING LTD.
146 Clerkenwell Road
London EC1
Phone: (01) 837-1222
Telex: UK-269477

Euan C. Rose
BEERE, HOBSON ASSOCIATES
34 Warwick Rd. Kenilworth
Warwickshire, CV8 1HE
Phone: (0926) 57619
Telex: UK-311951

WEST GERMANY
Eckhard Utpadel
CW PUBLIKATIONEN
Friedrichstrasse 31
8000 Munich 40
Phone: (089) 34-90-61
Telex: W.Ger-5-215250-HKFD

AUSTRALIA
Alan Power
COMPUTERWORLD PTY. LTD.
37-43 Alexander Street
Crows Nest, NSW 2065
Phone: (02) 439-5133
Telex: SECCO AA25468

BRAZIL
Eric Hippeau
COMPUTERWORLD do BRAZIL
Servicos e Publicacoes Ltda.
Rua Alcindo Guanabara
25/10th floor
20031 Rio de Janeiro, RJ
Phone: (021) 240-8225
Telex: 11-32017 (WORD BR)

MEXICO
Kevin Kelleghan
COMPUTERWORLD de MEXICO
Oaxaca 21-2
Colonia Roma
Mexico City 7 D.F.
Phone: (905) 514-4218
(905) 514-6309

TRADE·QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 15, 1981

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1980-81 RANGE (1)	CLOSE APR 15 1981	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	15- 42	42 1/8	+5 5/8	+15.4
N	BURROUGHS CORP	47- 88	50 3/8	- 1/8	-0.2
O	COMPUTER AUTOMATION	9- 27	15 1/4	+ 3/4	+5.1
N	CONTROL DATA CORP	35- 77	71 1/2	+2 1/4	+3.2
O	CRAY RESEARCH INC	10- 49	39 7/8	-1 1/4	-3.0
N	DATA GENERAL CORP	46- 87	60 1/2	+4 5/8	+8.2
N	DATAPOINT CORP	22- 65	64 3/4	+8 1/4	+14.6
N	DIGITAL EQUIPMENT	52- 98	94 3/4	+4 3/4	+5.2
A	EECO INC	6- 17	14 1/4	- 3/8	-2.5
N	ELECTRONIC ASSOC.	6- 12	8 1/4	- 1/8	-1.4
N	FOUR-PHASE SYSTEMS	19- 49	34 3/8	+ 3/4	+2.2
N	FOXBORO	31- 60	55 1/2	-1 3/8	-2.4
O	GENERAL AUTOMATION	7- 19	13 1/2	+ 1/4	+1.8
O	GRI COMPUTER CORP	1- 3	1 1/2	0	0.0
N	HARRIS CORP	25- 58	57 1/2	+5 1/8	+9.7
N	HEWLETT-PACKARD CO	46- 98	96 7/8	+2 5/8	+2.7
N	HONEYWELL INC	65-115	98 1/2	-3 1/4	-3.1
N	IBM	50- 79	59 5/8	- 3/8	-0.6
O	MAGNUSON COMP SYSTS	20- 48	28 1/2	+2	+7.5
N	MANAGEMENT ASSIST	9- 25	16 7/8	+2 7/8	+20.5
O	MINI-COMPUTER SYST	1- 6	1 7/8	0	0.0
N	MODULAR COMPUTER SYS	9- 31	13 3/4	- 1/4	-1.7
N	NCR	52- 82	67 3/4	+4	+6.2
N	PRIME COMPUTER INC	10- 41	37 1/8	+3 1/2	+10.4
N	PERKIN-ELMER	13- 35	28 7/8	0	0.0
N	SPERRY CORP	42- 65	56 3/8	+ 5/8	+1.1
O	TANDEM COMPUTERS INC	13- 85	83 1/4	+2 3/4	+3.4
N	TEXAS INSTRUMENTS	79-150	121 1/2	+6 7/8	+5.9
A	WANG LABS.	17- 60	34 3/4	- 5/8	-1.7

LEASING COMPANIES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE APR 15 1981	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	13- 27	24 1/2	+ 1/4	+1.0
N	COMDISCO INC	6- 24	21	+ 1/2	+2.4
A	COMMERCE GROUP CORP	1- 2	1	+ 1/8	+14.2
A	COMPUTER INVSTRS GRP	1- 4	3/8	- 1/8	-25.0
O	CONTINENTAL INFO SYS	2- 15	6 3/4	+ 1/4	+3.8
M	DATRONIC RENTAL	3- 5	4 1/4	0	0.0
A	DCL INC	3- 6	2 7/8	- 1/8	-4.1
N	DPF INC	5- 12	10	- 1/4	-2.4
O	ITEL	1- 15	7/8	0	0.0
O	LEASPAC CORP	1- 2	3/8	0	0.0
A	PIONEER TEX CORP	2- 4	3 1/4	0	0.0
N	RELIANCE GROUP INC	24- 79	75 7/8	+1 3/8	+1.8
N	U.S. LEASING	12- 30	27 1/2	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE APR 15 1981	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 6	4 1/2	+ 1/2	+12.5
O	ADVANCED SYSTEMS INC	12- 15	12 1/2	+ 1/2	+4.1
O	ANACOMP INC	7- 24	20 7/8	+ 7/8	+4.3
O	ANALYSTS INTL CORP	3- 14	8 3/4	0	0.0
A	APPLIED DATA RES.	6- 24	21	- 1/4	-1.1
N	AUTOMATIC DATA PROC	31- 59	58 3/4	+2 3/8	+4.2
O	CGA COMPUTER ASSOC	9- 17	12 1/2	+ 1/4	+2.0
O	COMPUTER HORIZONS	1- 5	2 3/8	0	0.0
O	COMPUTER NETWORK	4- 9	6	+ 5/8	+11.6
N	COMPUTER SCIENCES	11- 30	20 1/2	+2 1/4	+12.3
O	COMPUTER TASK GROUP	1- 23	18 1/4	0	0.0
O	COMPUTER USAGE	2- 10	4 1/2	- 1/2	-10.0
O	COMSHARE	11- 21	16 3/4	+ 1/4	+1.5
O	CULLINANE DATABASE	18- 59	58 1/4	+ 1/4	+0.4
O	DATA DIMENSIONS INC	1- 6	1 3/4	- 1/4	-12.5
O	DATATAB	1- 4	1 1/8	0	0.0
O	DSI CORP	4- 9	5 1/4	+ 1/8	+2.4
O	DYATRON CORP	4- 11	7 3/4	-1 1/2	-16.2
N	ELECTRONIC DATA SYST	19- 50	47 5/8	+ 1/8	+0.2
O	INFORMATICS INC	9- 33	31 1/4	+2	+6.8
O	INSYTE CORP	1- 3	2 1/8	- 1/8	-5.5
O	IPS COMPUTER MARKET.	1- 4	1 1/4	0	0.0
O	KEANE ASSOCIATES	3- 9	5 1/4	0	0.0
O	KEYDATA CORP	1- 5	3/4	0	0.0
A	LOGICON	12- 34	32	-2	-5.8
O	MATHEMATICA INC	5- 18	15 1/4	+1	+7.0
O	MATHEMATICAL APP GRP	7- 33	20 1/2	0	0.0
O	NATIONAL DATA CORP	5- 25	24 3/4	+2 5/8	+11.8
N	PLANNING RESEARCH	5- 13	7	- 1/8	-1.7
O	PROGRAMMING & SYS	1- 1	1	0	0.0
O	RAPIDATA INC	4- 11	7 1/2	+1 1/2	+25.0
O	REYNOLDS & REYNOLD	19- 34	20 1/2	- 3/4	-3.5
O	STSC INC	6- 28	19 1/2	+ 1/4	+1.2
O	SCIENTIFIC COMPUTERS	3- 17	11 1/2	0	0.0
N	TYMSHARE INC	17- 53	52 1/4	+1	+1.9
A	URS CORP	5- 17	13 1/8	- 1/2	-3.6
N	WYLY CORP	4- 20	13 5/8	+ 3/4	+5.8

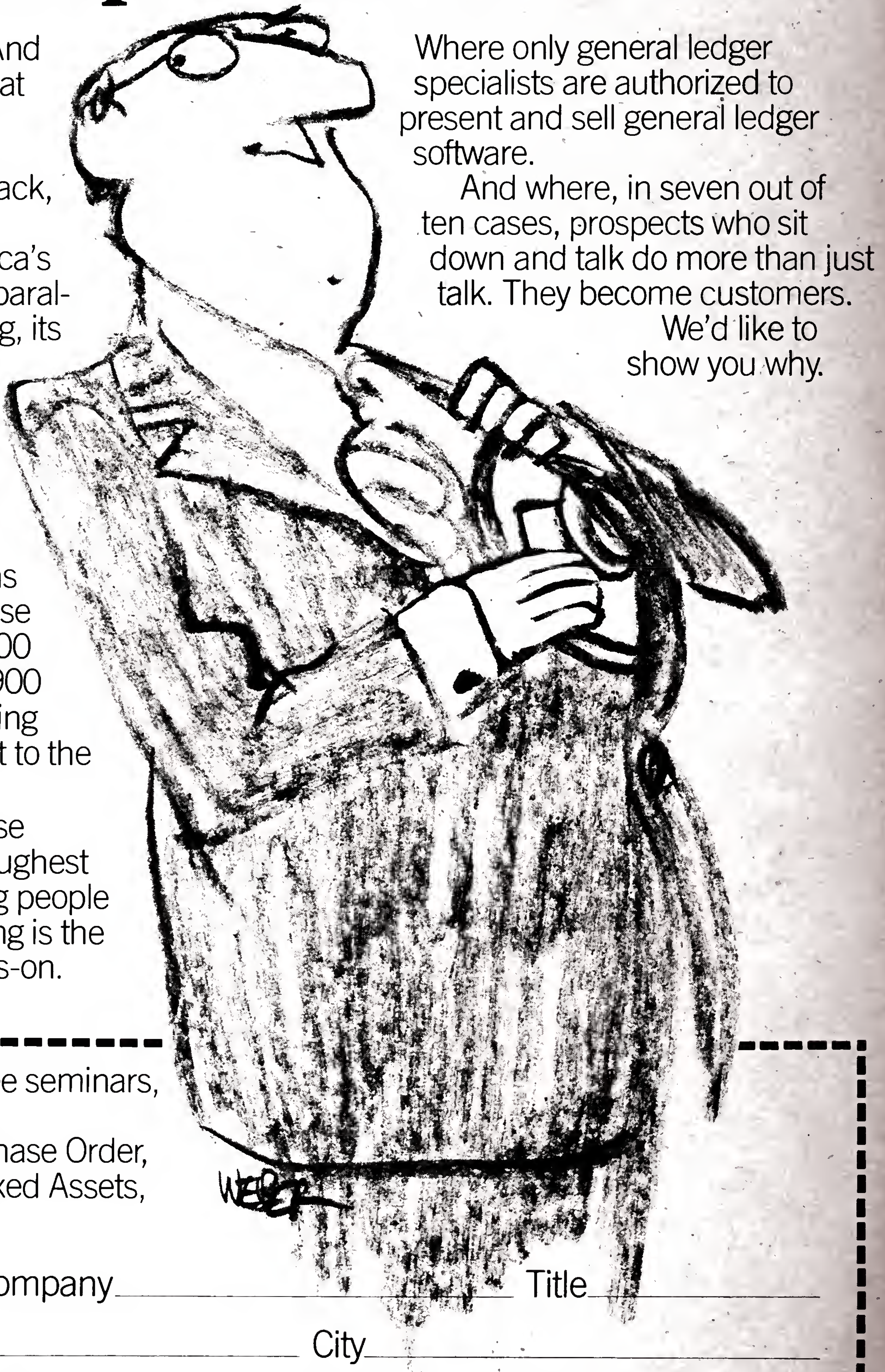
PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1980-81 RANGE (1)	CLOSE APR 15 1981	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	11- 24	15 3/8	+ 1/2	+3.3
A	ANDERSON JACOBSON	9- 25	18 1/2	+ 1/8	+0.6
O	AUTO-TROL TECHNOLOGY	18- 62	23 1/4	+1 1/4	+5.6
O	BEEHIVE INT'L	2- 18	14 1/2	- 1/4	-1.6
A	BOLT,BERANEK & NEW	12- 37	35	- 3/4	-2.0
N	BUNKER RAMO	17- 52	47 1/8	+1 1/8	+2.4
O	CAMBRIDGE MEMORIES	1- 9	5	+1 1/4	+33.3
N	CENTRONICS DATA COMP	13- 55	15 5/8	+2 1/8	+15.7
A	CETEC CORP	3- 8	8	+ 1/2	+6.6
O	COMPUTER DEVICES INC	5- 10	8 7/8	0	0.0
O	COGNITRONICS	1- 10	9 5/8	+ 1/2	+5.4
O	COMPUTER COMMUN.	2- 10	2 1/8	- 3/8	-14.6
O	COMPUTER CONSOLES	4- 29	22 1/2	+ 1/2	+2.2
O	COMPUTER TRANSCEIVER	1- 6	5	+ 1/2	+11.1
N	COMPUTERVISION CORP	24- 92	83 7/8	+1 5/8	+1.9
N	CONRAC CORP	13- 25	22	+ 1/4	+1.1
A	DATA ACCESS SYSTEMS	6- 23	13 3/4	-2 7/8	-17.2
A	DATAPRODUCTS CORP	11- 41	40 7/8	+2 1/4	+5.8
O	DATUM INC	2- 5	2 1/2	- 1/8	-4.7
O	DECISION DATA COMPUT	2- 6	3 3/4	0	0.0
O	DELTA DATA SYSTEMS	1- 3	2 5/8	- 1/8	-4.5
O	DATARAM CORP	6- 37	10 1/8	+ 3/8	+3.8
N	ELECTRONIC M & M	3- 9	5 1/2	- 1/4	-4.3
O	EVANS & SUTHERLAND	21- 83	81 1/2	+7	+9.3
O	FABRI-TEK	1- 4	3	+ 1/8	+4.3
O	GENERAL COMPUTER SYS	1- 12	10	+ 1/4	+2.5
O	GEN'L DATA COMM IND	8- 22	16 7/8	- 1/8	-0.7
O	GENERAL TERMINAL CP	1- 4	1 3/8	0	0.0
N	HAZELTINE CORP	12- 33	21 3/4	- 5/8	-2.7
O	INFORMATION INTL INC	8- 15	12 1/4	- 1/4	-2.0
O	INTEL CORP	23- 50	38 3/4	+3 1/4	+9.1
A	LUNDY ELECTRONICS	4- 17	10 1/8	- 3/8	-3.5
O	MSI DATA CORP	5- 19	18 1/4	+ 7/8	+5.0
N	MEMOREX	10- 34	14	+1 7/8	+15.4
N	MOHAWK DATA SCI	10- 31	25	+2	+8.6
O	NETWORK SYSTEMS CORP	14- 25	20 5/8	+ 3/4	+3.7
O	OMEX	2- 12	9	0	0.0
A	PARADYNE CORP	9- 43	43	+4 3/4	+12.4
A	PENRIL CORP	9- 16	15 1/4	+ 1/8	+0.8
O	RAMTEK CORP	10- 23	19 3/4	+ 1/2	+2.5
O	RECOGNITION EQUIP	5- 21	15 1/4	-1	-6.1
O	SCAN DATA	1- 5	2 1/2	- 1/8	-4.7
N	STORAGE TECHNOLOGY	12- 29	29 1/4	+3 1/2	+13.5
O	SYKES DATATRONICS	14- 54	54	+6 3/4	+14.2
O	T BAR INC	14- 24	17 7/8	+1 3/8	+8.3
A	TEC INC	3- 9	4 3/8	+ 1/8	+2.9
N	TEKTRONIX INC	42- 70	54 1/2	+2 3/4	+5.3
N	TELEX	3- 9	8	- 5/8	-7.2
O	TESDATA SYSTEMS CP	8- 26	9 7/8	+ 1/4	+2.5
A	TIMEPLEX INC	5- 22	13	+ 5/8	+5.0
O	WILTEK INC	1- 3	2 7/8	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE APR 15 1981	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	8- 16	15 7/8	- 1/4	-1.5
O	BALTIMORE BUS FORMS	1- 2	1 1/8	+ 1/8	+12.5
N	BARRY WRIGHT	8- 22	20 1/8	- 3/4	-3.5
O	CYBERMATICS INC	1- 2	1	0	0.0
A	DUPLEX PRODUCTS INC	11- 16	14 5/8	- 5/8	-4.0
N	ENNIS BUS. FORMS	13- 21	17 3/8	0	0.0
N	3M COMPANY	46- 65	63 1/4	+1 7/8	+3.0
O	MOORE CORP LTD	27- 38	37 1/4	0	0.0
N	NASHUA CORP	20- 35	23 3/4	+ 7/8	+3.8
O	STANDARD REGISTER	22- 35	34	+ 1/4	+0.7
A	TAB PRODUCTS CO	9- 30	19 5/8	+ 1/4	+1.2
N	WALLACE BUS FORMS	12- 26	24	+ 5/8	+2.6

Financial software so advanced that Encyclopaedia Britannica wants to keep it a secret.



Encyclopaedia Britannica. And over 1,000 other companies that benefit from McCormack & Dodge financial software.

When you're ahead of the pack, the less said the better.

Suffice it to say that Britannica's General Ledger package is unparalleled in its fast, flexible reporting, its efficient journal processing, its comprehensive editing and extended capacity for budget control.

Behind the package is a software company with proven success in the highest echelons of the publishing industry. Whose client list includes more than 100 of the *Fortune* 500. Plus over 900 other leading companies, ranging from the oldest and the biggest to the youngest and fastest growing.

McCormack & Dodge. Whose customers are the smartest, toughest controllers and data processing people in the world. Where user training is the way training ought to be: hands-on. Where only general ledger specialists are authorized to present and sell general ledger software.

And where, in seven out of ten cases, prospects who sit down and talk do more than just talk. They become customers.

We'd like to show you why.

Please send schedule of free seminars, plus information on:
☐ General Ledger, ☐ Purchase Order,
☐ Accounts Payable, ☐ Fixed Assets,
☐ Capital Project Analysis

Name________ Company________ Title________

Address________ City________

State____ Zip____ Phone________ Computer Model________

CW4/20

McCormack & Dodge

The best financial software. The best financial people.

560 Hillside Avenue, Needham Heights, MA 02194, (617) 449-4012
Atlanta (404) 997-2797, Chicago (312) 843-3400, Dallas (214) 369-7014, Los Angeles (213) 645-6382, San Francisco (415) 398-2960, Washington D.C. (703) 734-0710
New York/New Jersey (201) 528-6331 • Canada • United Kingdom/Netherlands • Italy • Australia/New Zealand • Mexico • South Africa • Sweden • Hong Kong